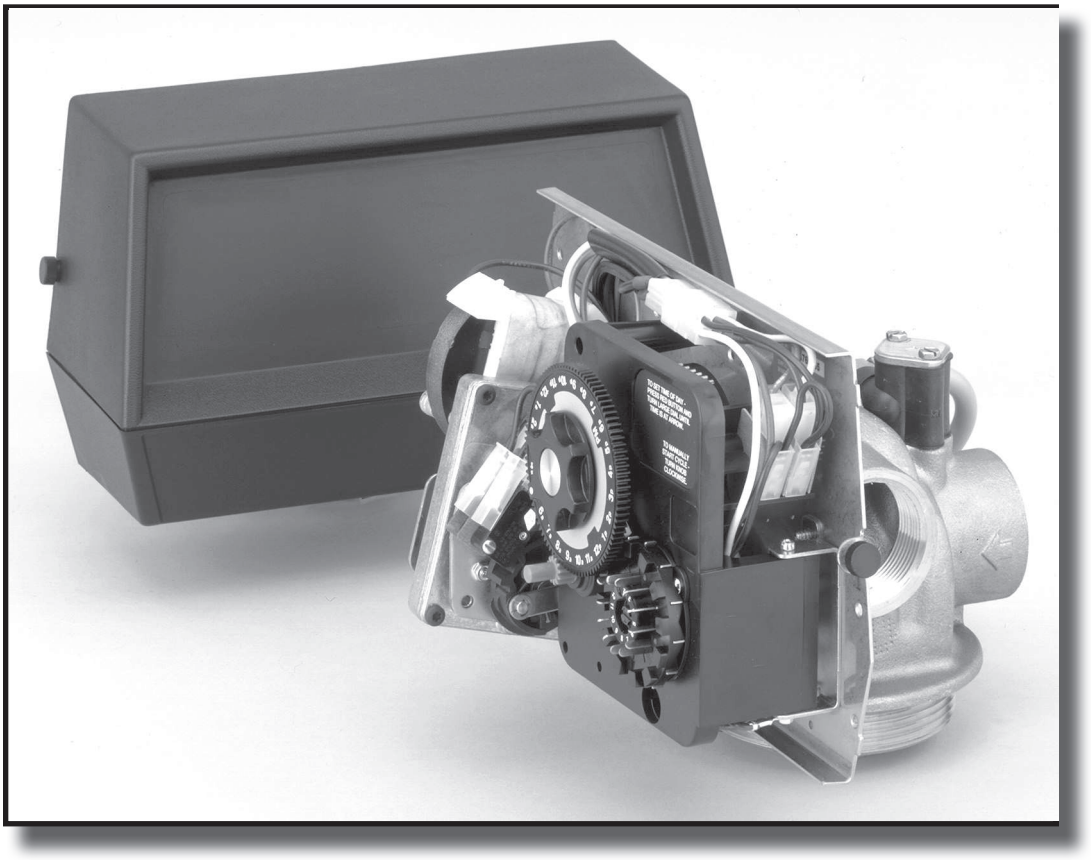
# Model 2850

## *Service Manual*



**IMPORTANT: Fill in Pertinent Information on Page 3 for Future Reference**

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**IMPORTANT: The information, specifications and illustrations in this manual are based on the latest information available at the time of printing. The manufacturer reserves the right to make changes at any time without notice.**

# *Job Specification Sheet*

Job Number: _____

Model Number: _____

Water Hardness: _____ ppm or gpg

Capacity Per Unit: _____

Mineral Tank Size: _____ Diameter: _____ Height:

Salt Setting per Regeneration: _____

1. **Type of Timer:**
   A. 7 Day or 12 Day  B. Meter Initiated
2. **Downflow:**  **Upflow**  **Upflow Variable**
3. **Meter Size:**
   A. 3/4” Std Range (125 - 2,100 gallon setting)
   B. 3/4” Ext Range (625 - 10,625 gallon setting)
   C. 1” Std Range (310 - 5,270 gallon setting)
   D. 1” Ext Range (1,150 - 26,350 gallon setting)
   E. 1-1/2” Std Range (625 - 10,625 gallon setting)
   F. 1-1/2” Ext Range (3,125 - 53,125 gallon setting)
   G. 2” Std Range (1,250 - 21,250 gallon setting)
   H. 2” Ext Range (6,250 - 106,250 gallon setting)
   I. 3” Std Range (3,750 - 63,750 gallon setting)
   J. 3” Ext Range (18,750 - 318,750 gallon setting)
   K. Electronic_____ Pulse Count _____ Meter Size
4. **System Type:**
   A. System #4: 1 Tank, 1 Meter, Immediate, or Delayed Regeneration
   B. System #4: Time Clock
   C. System #4: Twin Tank
   D. System #5: 2-5 Tanks, 2 Meters, Interlock
   E. System #6: 2-5 Tanks, 1 Meter, Series Regeneration
   F. System #7: 2-5 Tanks, 1 Meter, Alternating
   G. System #9: Electronic Only, 2-4 Tanks, Meter per Valve, Alternating
   H. System #14: Electronic Only, 2-4 Tanks, Meter per Valve. Brings units on and offline based on flow.
5. **Timer Program Settings:**
   A. Backwash: _____ Minutes
   B. Brine and Slow Rinse: _____ Minutes
   C. Rapid Rinse: _____ Minutes
   D. Brine Tank Refill: _____ Minutes
   E. Pause Time: _____ Minutes
   F. Second Backwash: _____ Minutes
6. **Drain Line Flow Control:** _____ gpm
7. **Brine Line Flow Controller:** _____ gpm
8. **Injector Size#:** _____
9. **Piston Type:**
   A. Hard Water Bypass
   B. No Hard Water Bypass

# Installation Instructions

**WATER PRESSURE:** A minimum of 20 pounds (1.4 bar) of water pressure is required for regeneration valve to operate effectively.

**ELECTRICAL FACILITIES:** An uninterrupted alternating current (A/C) supply is required. Note: Other voltages are available. Please make sure your voltage supply is compatible with your unit before installation.

**EXISTING PLUMBING:** Condition of existing plumbing should be free from lime and iron buildup. Piping that is built up heavily with lime and/or iron should be replaced. If piping is clogged with iron, a separate iron filter unit should be installed ahead of the water softener.

**LOCATION OF SOFTENER AND DRAIN:** The softener should be located close to a drain to prevent air breaks and back flow.

**BY-PASS VALVES:** Always provide for the installation of a by-pass valve if unit is not equipped with one.

**CAUTION:** Water pressure is not to exceed 125 psi (8.6 bar), water temperature is not to exceed 110°F (43°C), and the unit cannot be subjected to freezing conditions.

**Installation Instructions**

1. Place the softener tank where you want to install the unit making sure the unit is level and on a firm base.
2. During cold weather, the installer should warm the valve to room temperature before operating.
3. All plumbing should be done in accordance with local plumbing codes. The pipe size for residential drain line should be a minimum of 1/2” (13 mm). Backwash flow rates in excess of 7 gpm (26.5 Lpm) or length in excess of 20’ (6 m) require 3/4” (19 mm) drain line. Commercial drain lines should be the same size as the drain line flow control.
4. Refer to the dimensional drawing for cutting height of the distributor tube. If there is no dimensional drawing, cut the distributor tube flush with the top of the tank.
5. Lubricate the distributor O-ring seal and tank O-ring seal. Place the main control valve on tank. Note: Only use silicone lubricant.
6. Solder joints near the drain must be done prior to connecting the Drain Line Flow Control fitting (DLFC). Leave at least 6” (15 cm) between the DLFC and solder joints when soldering pipes that are connected on the DLFC. Failure to do this could cause interior damage to the DLFC.
7. Teflon tape is the only sealant to be used on the drain fitting. The drain from twin tank units may be run through a common line.
8. Make sure that the floor is clean beneath the salt storage tank and that it is level.
9. Place approximately 1” (25 mm) of water above the grid plate. If a grid is not utilized, fill to the top of the air check (Figure 1) in the salt tank. Do not add salt to the brine tank at this time.
10. On units with a by-pass, place in by-pass position. Turn on the main water supply. Open a cold soft water tap nearby and let run a few minutes or until the system is free from foreign material (usually solder) that may have resulted from the installation. Once clean, close the water tap.
11. Slowly place the by-pass in service position and let water flow into the mineral tank. When water flow stops, slowly open a cold water tap nearby and let run until the air is purged from the unit.
12. Plug unit into an electrical outlet. Note: All electrical connections must be connected according to local codes. Be certain the outlet is uninterrupted.

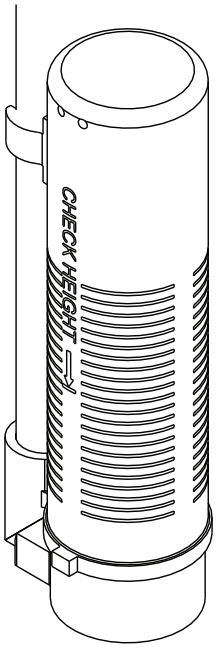


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**Figure 1 Residential Air Check Valve**

**CAUTION**
- **Do not exceed 125 psi water pressure**
- **Do not exceed 110°F (43°C) water temperature**
- **Do not subject unit to freezing conditions**

The water softener should be installed with the inlet, outlet, and drain connections made in accordance with the manufacturer's recommendations, and to meet applicable plumbing codes.

1. Turn the manual regeneraton knob slowly in a clockwise direction until the program micro switch lifts on top of the first set of pins. Allow the drive motor to move the piston to the first regeneration step and stop. Each time the program switch position changes, the valve will advance to the next regeneration step. Always allow the motor to stop before moving to the next set of pins or spaces.
   **NOTE: For electronic valves, please refer to the manual regeneration part of the timer operation section. If the valve came with a separate electronic timer service manual, refer to the timer operation section of the electronic timer service manual.**
2. Position the valve to backwash. Ensure the drain line flow remains steady for 10 minutes or until the water runs clear (see above).
3. Position the valve to the brine / slow rinse position. Ensure the unit is drawing water from the brine tank (this step may need to be repeated).
4. Position the valve to the rapid rinse position. Check the drain line flow, and run for 5 minutes or until the water runs clear.
5. Position the valve to the start of the brine tank fill cycle. Ensure water goes into the brine tank at the desired rate. The brine valve drive cam will hold the valve in this position to fill the brine tank for the first regeneration.
6. Replace control box cover.
7. Put salt in the brine tank.

   **NOTE: Do not use granulated or rock salt.**

# 3200 Timer Setting Procedure

**How To Set Days On Which Water Conditioner Is To Regenerate (Figure 2):**

Rotate the skipper wheel until the number “1” is at the red pointer. Set the days that regeneration is to occur by sliding tabs on the skipper wheel outward to expose trip fingers. Each tab is one day. Finger at red pointer is tonight. Moving clockwise from the red pointer, extend or retract fingers to obtain the desired regeneration schedule.

**How To Set The Time Of Day:**

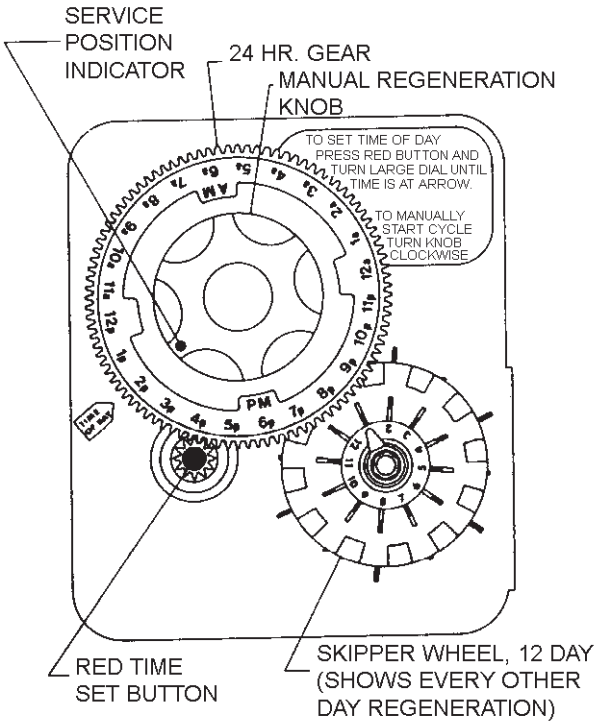
1. Press and hold the red button in to disengage the drive gear.
2. Turn the large gear until the actual time of day is at the time of day pointer.
3. Release the red button to again engage the drive gear.

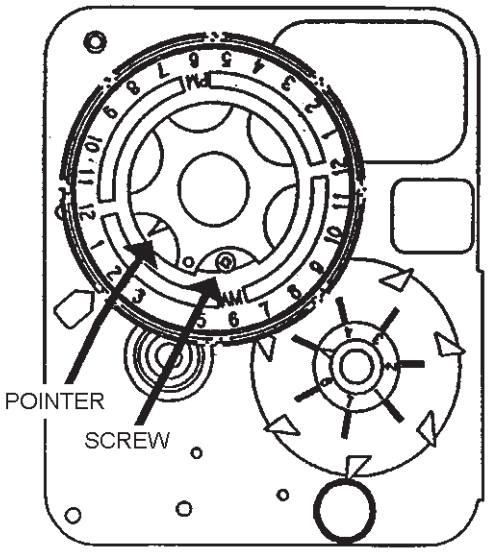
**How To Manually Regenerate Your Water Conditioner At Any Time:**

1. Turn the manual regeneration knob clockwise.
2. This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.
3. The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.
4. Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set for only one half of this time.
5. In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

**How to Adjust Regeneration Time:**

1. Disconnect the power source.
2. Locate the three screws behind the manual regeneration knob by pushing the red button in and rotating the 24 hour dial until each screw appears in the cut out portion of the manual regeneration knob.
3. Loosen each screw slightly to release the pressure on the time plate from the 24 hour gear.
4. Locate the regeneration time pointer on the inside of the 24 hour dial in the cut out.
5. Turn the time plate so the desired regeneration time aligns next to the raised arrow.
6. Push the red button in and rotate the 24 hour dial. Tighten each of the three screws.
7. Push the red button and locate the pointer one more time to ensure the desired regeneration time is correct.
8. Reset the time of day and restore power to the unit.




3200 ADJUSTABLE REGENERATION TIMER

**IMPORTANT!**
**SALT LEVEL MUST ALWAYS BE ABOVE WATER LEVEL IN BRINE TANK**

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**Figure 2**

**Typical Programming Procedure**

Calculate the gallon capacity of the system, subtract the necessary reserve requirement and set the gallons available opposite the small white dot on the program wheel gear (Figure 3).

**NOTE:** Drawing shows 8,750 gallon setting. The capacity (gallons) arrow (15) shows zero gallons remaining. The unit will regenerate tonight at the set regeneration time.

**How To Set The Time Of Day:**

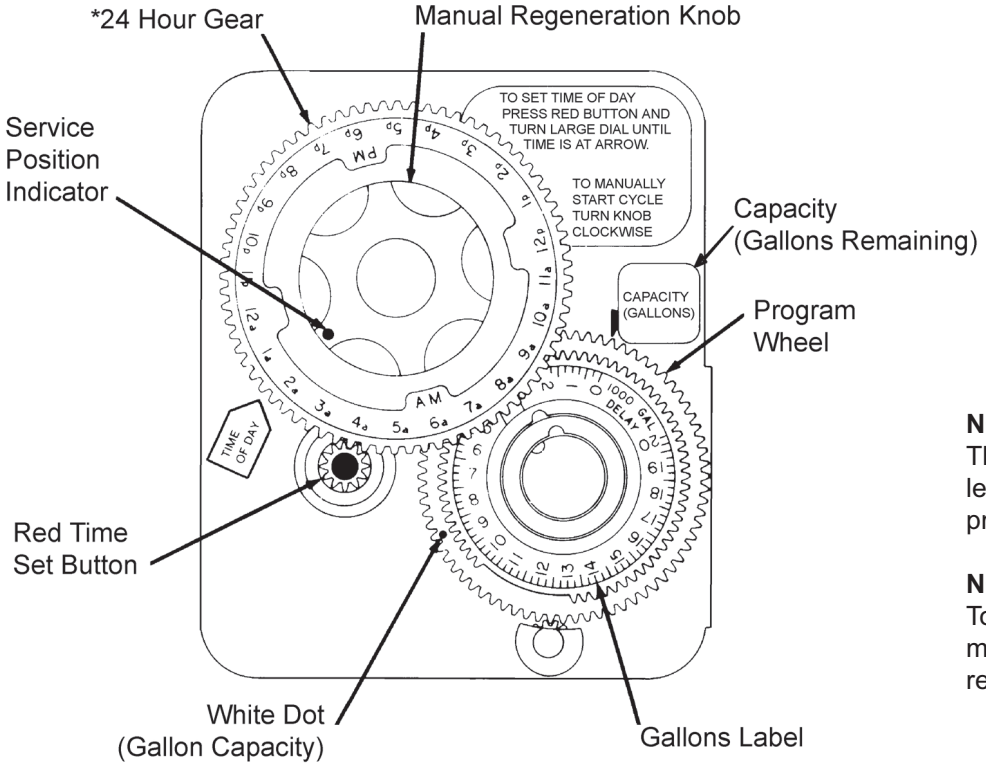
1. Press and hold the red button in to disengage the drive gear.
2. Turn the large gear until the actual time of day is opposite the time of day pointer.
3. Release the red button to again engage the drive gear.

**How To Manually Regenerate Your Water Conditioner At Any Time:**

1. Turn the manual regeneration knob clockwise.
2. This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.
3. The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.
4. Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set for only one half of this time.
5. In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

**Immediate Regeneration Timers:**

These timers do not have a 24 hour gear. Setting the gallons on the program wheel and manual regeneration procedure are the same as previous instructions. The timer will regenerate as soon as the capacity gallons reaches zero.




**NOTE:**
The program wheel to the left may be different than the program wheel on the product.

**NOTE:**
To set meter capacity rotate manual knob one - 360° revolution to set gallonage.

*Immediate regeneration timers do not have a 24-hour gear. No time of day can be set.

61502_3200REVA

**Figure 3**

# 3200, 3210, 3220, 3230 Regeneration Cycle Setting Procedure

**How To Set The Regeneration Cycle Program:**

The regeneration cycle program on your water conditioner has been factory preset, however, portions of the cycle or program may be lengthened or shortened in time to suit local conditions.

**3200 Series Timers (Figure 4)**

1. To expose cycle program wheel, grasp timer in upper left-hand corner and pull, releasing snap retainer and swinging timer to the right.
2. To change the regeneration cycle program, the program wheel must be removed. Grasp program wheel and squeeze protruding lugs toward center, lift program wheel off timer. Switch arms may require movement to facilitate removal.
3. Return timer to closed position engaging snap retainer in back plate. Make certain all electrical wires locate above snap retainer post.

## Timer Setting Procedure

**How To Change The Length Of The Backwash Time:**

The program wheel as shown in the drawing is in the service position. As you look at the numbered side of the program wheel, the group of pins starting at zero determines the length of time your unit will backwash.

**EXAMPLE:** If there are six pins in this section, the time of backwash will be 12 min. (2 min. per pin). To change the length of backwash time, add or remove pins as required. The number of pins times two equals the backwash time in minutes.

**How To Change The Length Of Brine And Rinse Time:**

1. The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse (2 min. per hole).
2. To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and rinse section. Number of holes times two equals brine and rinse time in minutes.

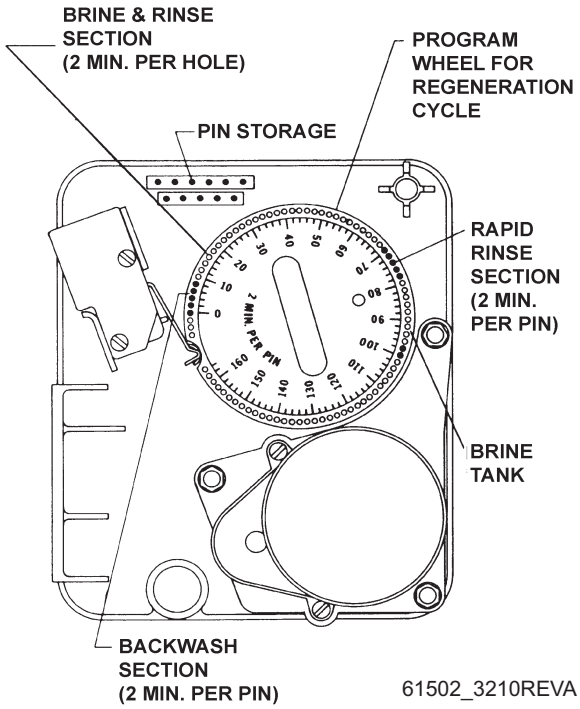



**Figure 4**

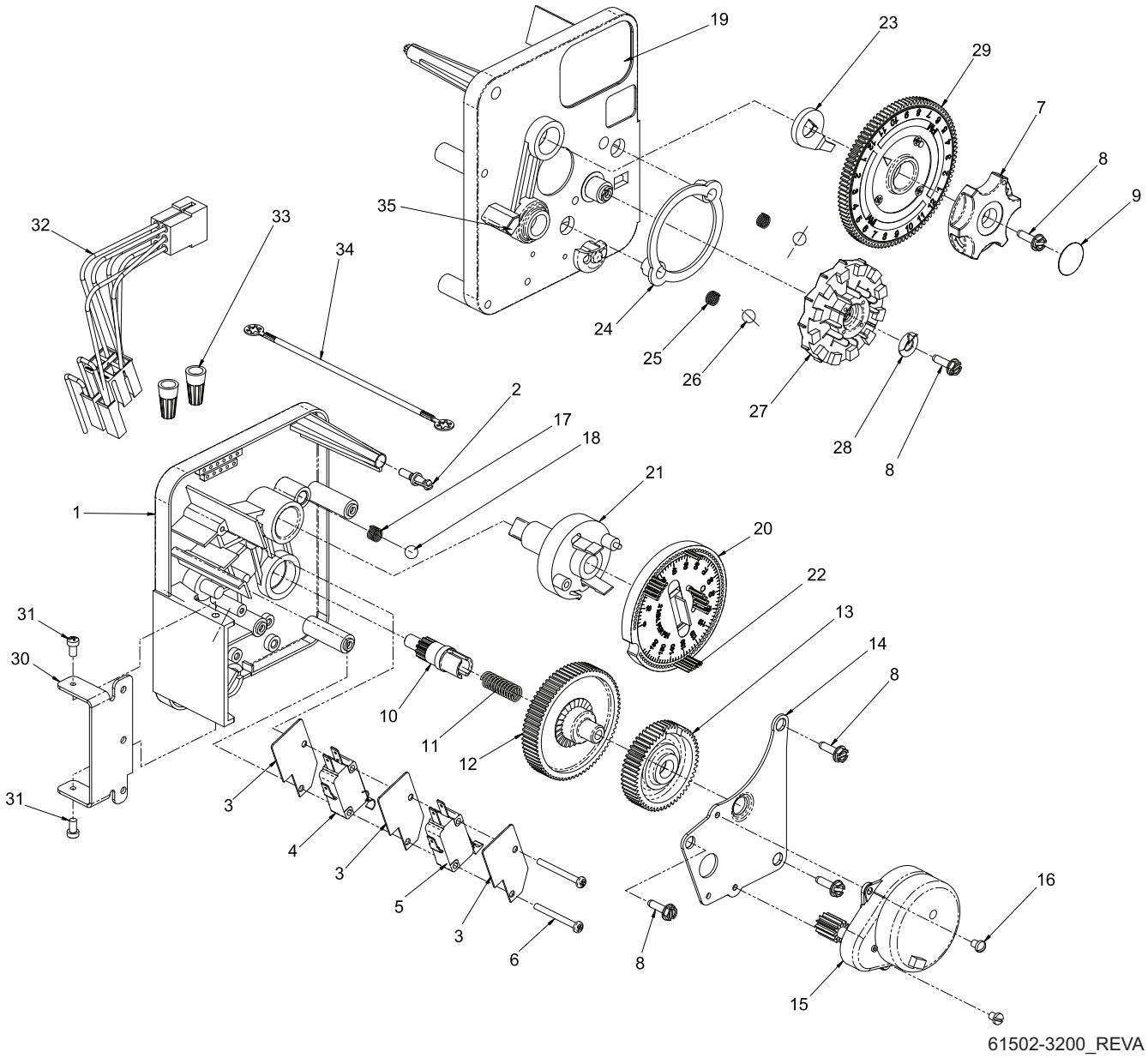
**How To Change The Length Of Rapid Rinse:**

1. The second group of pins on the program wheel determines the length of time that your water conditioner will rapid rinse (2 min. per pin).
2. To change the length of rapid rinse time, add or remove pins at the higher numbered end of this section as required. The number of pins times two equals the rapid rinse time in minutes.

**How To Change The Length Of Brine Tank Refill Time:**

1. The second group of holes in the program wheel determines the length of time that your water conditioner will refill the brine tank (2 min. per hole).
2. To change the length of refill time, move the two pins at the end of the second group of holes as required.
3. The regeneration cycle is complete when the outer microswitch is tripped by the two pin set at end of the brine tank refill section.
4. The program wheel, however, will continue to rotate until the inner micro switch drops into the notch on the program wheel.

# 3200 Time Clock Timer Assembly



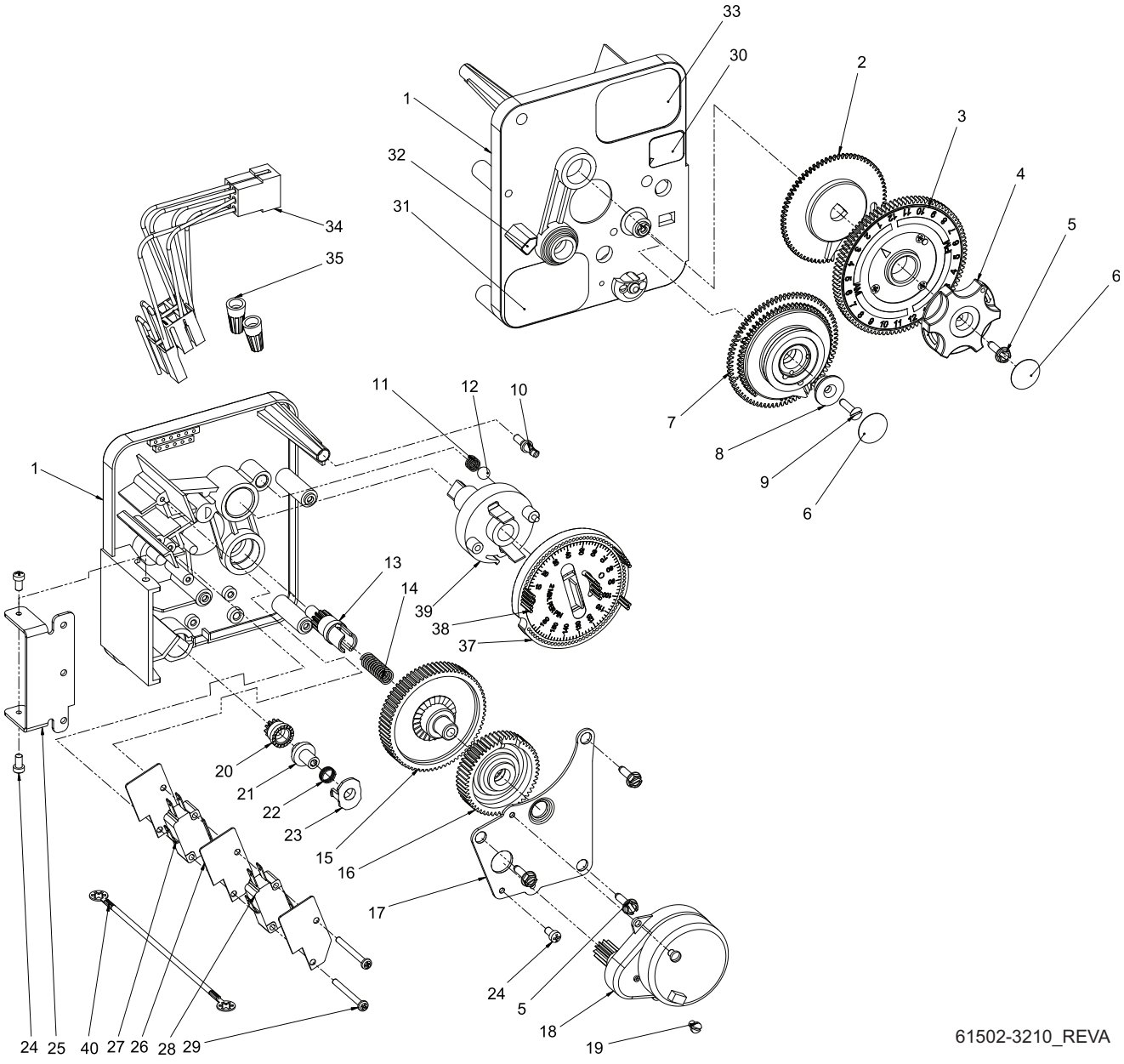

**For Service Assembly Numbers, See the Back of this Manual**

# 3200 Time Clock Timer Assembly

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 13870 | Housing, Timer, 3200 |
| 2 | 1 | 14265 | Clip, Sping |
| 3 | 3 | 14087 | Insulator |
| 4 | 1 | 10896 | Switch, Micro |
| 5 | 1 | 15320 | Switch, Micro, Timer |
| 6 | 2 | 11413 | Screw, Pan Hd Mach, 4-40 x 1-1/8 |
| 7 | 1 | 13886 | Knob, 3200 |
| 8 | 5 | 13296 | Screw, Hex Wsh, 6-20 x 1/2 |
| 9 | 1 | 11999 | Label, Button |
| 10 | 1 | 13018 | Pinion, Idler |
| 11 | 1 | 13312 | Spring, Idler Shaft |
| 12 | 1 | 13017 | Gear, Idler |
| 13 | 1 | 13164 | Gear, Drive |
| 14 | 1 | 13887 | Plate, Motor Mounting |
| 15 | 1 | 18743-1 | Motor, 120V, 60Hz, 1/30 RPM, 5600 |
| | | 19659-1 | Motor, 24V, 60Hz, 1/30 RPM |
| 16 | 2 | 13278 | Screw, Sltd Fillister Hd 6-32 x .156 |
| 17 | 1 | 15424 | Spring, Detent, Timer |
| 18 | 1 | 15066 | Ball, 1/4”, Delrin |
| 19 | 1 | 15465 | Label, Caution |
| 20 | 1 | 19210 | Program Wheel Assy |
| 21 | 1 | 13911 | Gear, Main Drive, Timer |
| 22 | 17 | 41754 | Pin, Spring, 1/16 x 5/8 SS, Timer |
| 23 | 1 | 13011 | Arm, Cycle Actuator |
| 24 | 1 | 13864 | Ring, Skipper Wheel |
| 25 | 2 | 13311 | Spring, Detent, Timer |
| 26 | 2 | 13300 | Ball, 1/4”, SS |
| 27 | 1 | 14381 | Skipper Wheel Assy, 12 Day |
| | | 14860 | Skipper Wheel Assy, 7 Day |
| 28 | 1 | 13014 | Pointer, Regeneration |
| 29 | 1 | 40096-24 | Dial, 12 AM Regen Assy, Black |
| | | 40096-02 | Dial, 2 AM Regen Assy, Black |
| 30 | 1 | 13881 | Bracket, Hinger Timer |
| 31 | 2 | 11384 | Screw, Phil, 6-32 x 1/4 Zinc |
| 32 | 1 | 13902 | Harness, 3200 |
| 33 | 2 | 40422 | Nut, Wire, Tan |
| 34 | 1 | 15354-01 | Wire, Ground, 4” |
| 35 | 1 | 14007 | Label, Time of Day |

**For Service Assembly Numbers, See the Back of this Manual**

# 3210 Meter Delayed Timer Assembly



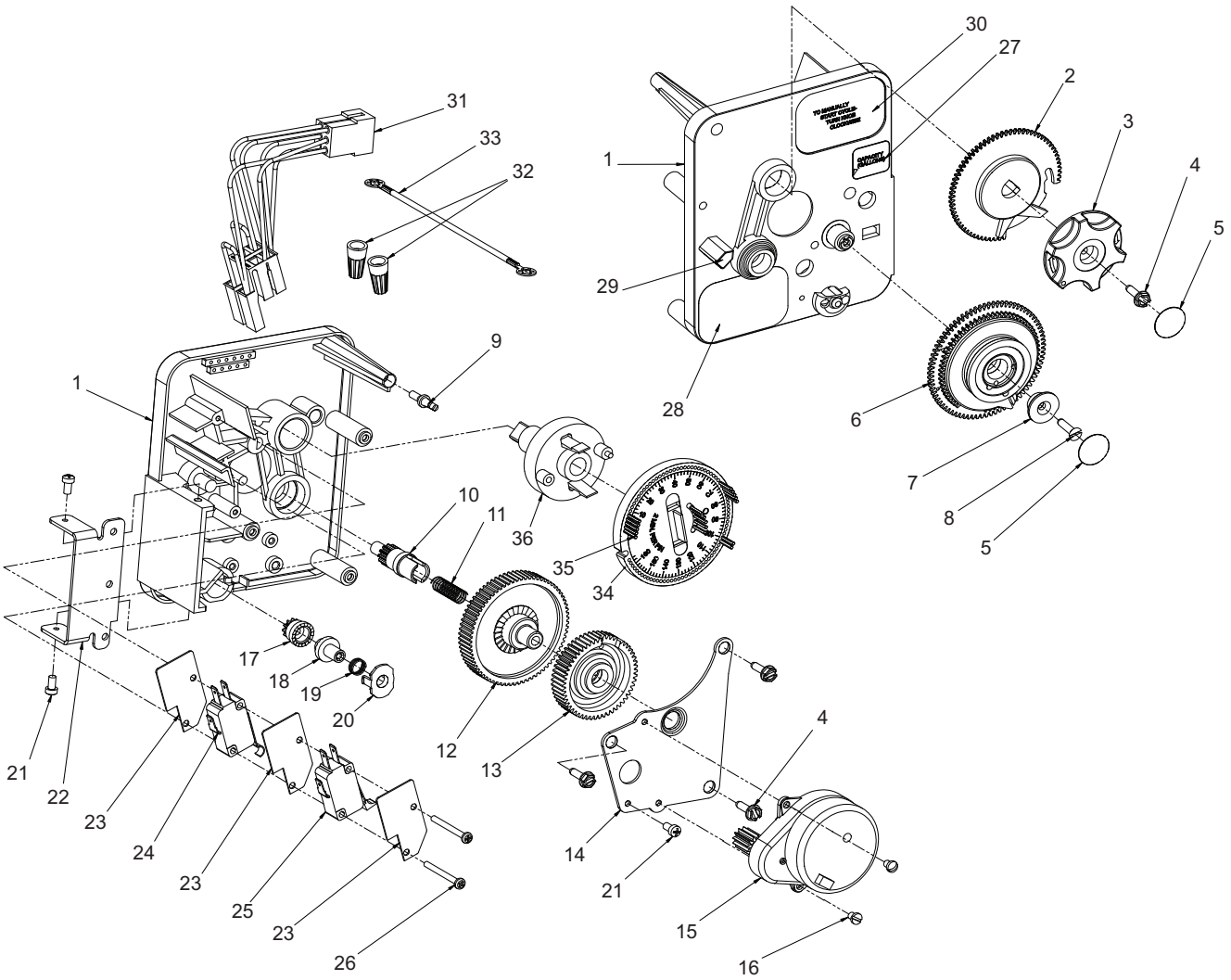

**For Service Assembly Numbers, See the Back of this Manual**

# 3210 Meter Delayed Timer Assembly

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 13870 | Housing, Timer, 3200 |
| 2 | 1 | 13802 | Gear, Cycle Actuator |
| 3 | 1 | 40096-02 | Dial 2 AM Regen Assy, Black |
| 4 | 1 | 13886 | Knob, 3200 |
| 5 | 4 | 13296 | Screw, Hex Wsh, 6-20 x 1/2 |
| 6 | 2 | 11999 | Label, Button |
| 7 | 1 | 60405-20 | Program Wheel, w/34” Ext Label, 1-1/2” STD Set @ 100 |
| 8 | 1 | 13806 | Retainer, Program Wheel |
| 9 | 1 | 13748 | Screw, Flat Head St, 6-20 x 1/2 |
| 10 | 1 | 14265 | Clip, Spring |
| 11 | 1 | 15424 | Spring, Detent, Timer |
| 12 | 1 | 15066 | Ball, 1/4” Delrin |
| 13 | 1 | 13018 | Pinion, Idler |
| 14 | 1 | 13312 | Spring, Idler Shaft |
| 15 | 1 | 13017 | Gear, Idler |
| 16 | 1 | 13164 | Gear, Drive |
| 17 | 1 | 13887 | Plate, Motor Mounting |
| 18 | 1 | 18743-1 | Motor, 120V, 60Hz 1/30 RPM, 5600 |
| 19 | 1 | 13278 | Screw, Fillister Hd, 6-32 x .156 |
| 20 | 1 | 13830 | Pinion, Program Wheel Drive |
| 21 | 1 | 13831 | Clutch, Drive Pinion |
| 22 | 1 | 14276 | Spring, Meter, Clutch |
| 23 | 1 | 14253 | Retainer, Clutch Spring |
| 24 | 3 | 11384 | Screw, Phil, 6-32 x 1/4 |
| 25 | 1 | 13881 | Bracket, Hinge Timer |
| 26 | 3 | 14087 | Insulator |
| 27 | 1 | 10896 | Switch, Micro |
| 28 | 1 | 15320 | Switch, Micro, Timer |
| 29 | 2 | 11413 | Screw, Pan Hd Mach, 4-40 x 1 1/8 |
| 30 | 1 | 14198 | Label, Indicator |
| 31 | 1 | 15465 | Label, Caution |
| 32 | 1 | 14007 | Label, Time of Day |
| 33 | 1 | 14045 | Label, Instruction |
| 34 | 1 | 13902 | Harness, 3200 |
| 35 | 2 | 40422 | Nut, Wire, Tan |
| 36 | 1 | 15354-01 | Wire, Ground, 4” |
| 37 | 1 | 19210 | Program Wheel Assy |
| 38 | 17 | 41754 | Pin, Spring, 1/16 x 5/8 SS, Timer |
| 39 | 1 | 13911 | Gear, Main Drive, Timer |

**For Service Assembly Numbers, See the Back of this Manual**

# 3220 Meter Immediate Timer Assembly



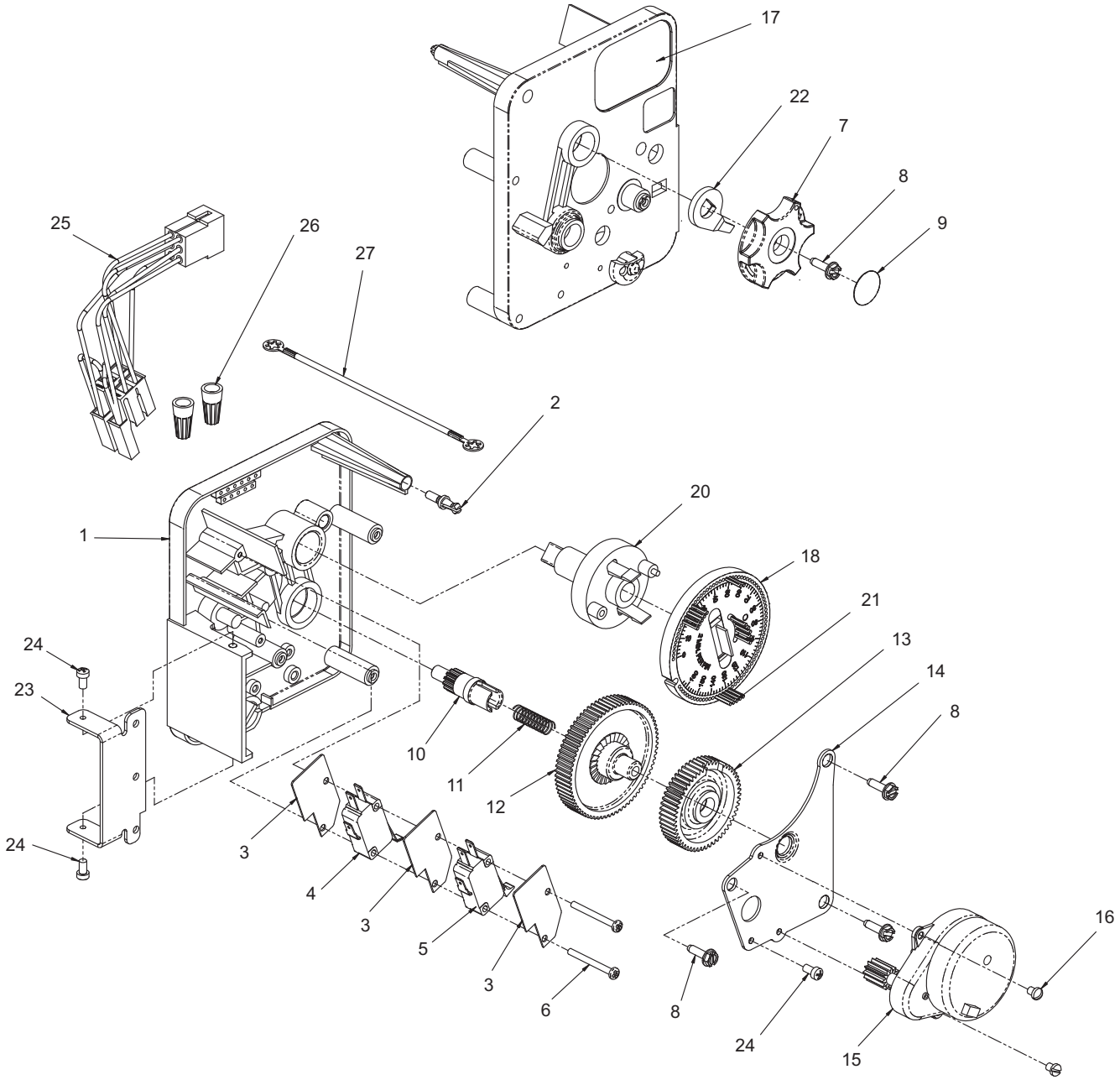

**For Service Assembly Numbers, See the Back of this Manual**

# 3220 Meter Immediate Timer Assembly

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 13870 | Housing, Timer |
| 2 | 1 | 15431 | Gear, Cycle Actuator, System #5 |
| 3 | 1 | 13886 | Knob, 3200 |
| 4 | 4 | 13296 | Screw, Hex Wsh, 6-20 x 1/2 |
| 5 | 2 | 11999 | Label, Button |
| 6 | 1 | 60408-50 | Program Wheel, W/2” Std Label |
| 7 | 1 | 13806 | Retainer, Program Wheel |
| 8 | 1 | 13748 | Screw, Flt Hd St, 6-20 x 1/2 |
| 9 | 1 | 14265 | Spring Clip |
| 10 | 1 | 13018 | Pinion, Idler |
| 11 | 1 | 18563 | Idler Shaft Spring |
| 12 | 1 | 13017 | Gear, Idler |
| 13 | 1 | 13164 | Drive Gear |
| 14 | 1 | 13887 | Plate, Motor Mounting |
| 15 | 1 | 18743-1 | Motor, 120V, 60 Hz, 1/30 rpm, 5600 |
| 16 | 2 | 13278 | Screw, Sltd Fillister Hd |
| 17 | 1 | 14502 | Pinion, Program Wheel |
| 18 | 1 | 14501 | Clutch, Drive Pinion |
| 19 | 1 | 14276 | Meter Clutch Spring |
| 20 | 1 | 14253 | Retainer, Clutch Spring |
| 21 | 3 | 11384 | Screw, Phil, 6-32 x 1/4 Zinc |
| 22 | 1 | 13881 | Bracket, Hinge Timer |
| 23 | 3 | 14087 | Insulator |
| 24 | 1 | 15414-00 | Micro Switch |
| 25 | 1 | 15320 | Switch, Micro, Timer |
| 26 | 2 | 11413 | Screw, Pan Hd Mach, 4-40 x 1-1/8 |
| 27 | 1 | 14198 | Label, Indicator |
| 28 | 1 | 15465 | Label, Caution |
| 29 | 1 | 14007 | Label, Time of Day |
| 30 | 1 | 15148 | Label, Instruction |
| 31 | 1 | 40617 | Harness, 3220 |
| 32 | 2 | 40422 | Nut, Wire, Tan |
| 33 | 1 | 15354-01 | Wire, Ground, 4” |
| 34 | 1 | 19210-05 | Program Wheel Assembly, 9000/3230 |
| 35 | 17 | 41754 | Pin, Spring, 1/16 x 5/8 Stainless Steel, Timer |
| 36 | 1 | 15055 | Gear, Main Drive |

**For Service Assembly Numbers, See the Back of this Manual**

# 3230 Remote Start Timer Assembly



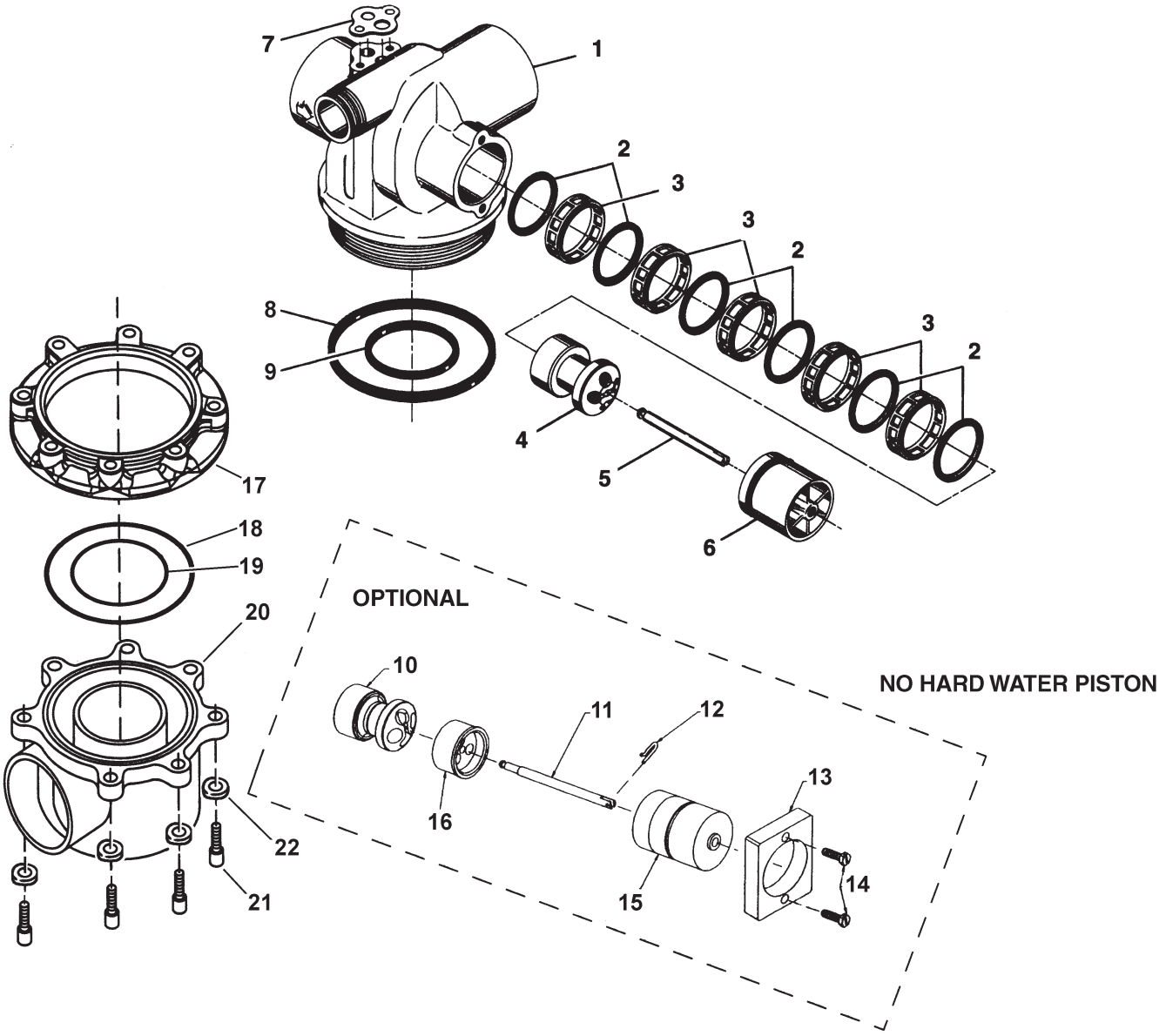

**For Service Assembly Numbers, See the Back of this Manual**

# 3230 Remote Start Timer Assembly

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 13870 | Housing, Timer |
| 2 | 1 | 14265 | Spring Clip |
| 3 | 3 | 14087 | Insulator |
| 4 | 1 | 15314 | Micro Switch |
| 5 | 1 | 15320 | Switch, Micro, Timer |
| 6 | 2 | 11413 | Screw, Pan Hd Mach, 4-40 x 1-1/8 |
| 7 | 1 | 13886 | Knob, 3200 |
| 8 | 4 | 13296 | Screw, Hex Wsh, 6-20 x 1/2 |
| 9 | 1 | 11999 | Label, Button |
| 10 | 1 | 13018 | Pinion, Idler |
| 11 | 1 | 18563 | Idler Shaft Spring |
| 12 | 1 | 13017 | Gear, Idler |
| 13 | 1 | 15055 | Drive Gear |
| 14 | 1 | 13887 | Plate, Motor Mounting |
| 15 | 1 | 18743-1 | Motor, 120V, 60 Hz, 1/30 rpm |
| | 1 | 19659-1 | Motor, 24V, 60 Hz 1/30 rpm |
| 16 | 2 | 13278 | Screw, Sltd Fillister Hd |
| 17 | 1 | 15313 | Label, Caution |
| 18 | 1 | 19210-05 | Program Wheel Assembly, 3200 |
| 20 | 1 | 15055 | Main Drive Gear |
| 21 | 17 | 41754 | Pin, Spring, 1/16 x 5/8 Stainless Steel, Timer |
| 22 | 1 | 13011 | Cycle Actuator Arm |
| 23 | 1 | 13881 | Bracket, Hinge Timer |
| 24 | 3 | 11384 | Screw, Phil, 6-32 x 1/4 Zinc |
| 25 | 1 | 16336 | Harness, 3230R |
| 26 | 2 | 40422 | Nut, Wire, Tan |
| 27 | 1 | 15354-01 | Wire, Ground, 4” |

**For Service Assembly Numbers, See the Back of this Manual**

# Control Valve with 1700 Injector Assembly




61500-2850_REVB

**For Service Assembly Numbers, See the Back of this Manual**

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 16250-01 | Valve Body, 2850, Machd |
| 2 | 6 | 16101 | Seal, 2850 |
| 3 | 5 | 16638 | Spacer, 9500/2850 |
| 4 | 1 | 16092 | Piston, 2850 |
| 5 | 1 | 16436 | Piston, 2850 |
| 6 | 1 | 16395 | End Plug Assy, 2850 |
| | | 16395-01 | End Plug Assy, 2850, Hot Water |
| 7 | 1 | 14805 | Gasket, Injector Body, 1600/1700 |
| 8 | 1 | 16455 | O-ring, -347 |
| *9 | 1 | 13577 | O-ring, -226 |
| 10 | 1 | 19606 | Piston, 2850, NHWBP |
| 11 | 1 | 19300 | Rod, Piston, 2850 |
| 12 | 1 | 10909 | Pin, Link |
| 13 | 1 | 19339 | Spacer, 2850, NHWBP |
| 14 | 2 | 13386 | Screw, Hex Hd Mach, 1/4 - 20x1 |
| 15 | 1 | 16395-02 | End Plug Assy/2850, NHWBP |
| 16 | 1 | 19298-01 | Piston Assy, 2850, NHWBP, O-ring |
| Not Shown | 1 | 60366-xx | DLFC 1” NPT (not shown) - specify size |
| Not Shown | 1 | 17996 | Disperser, Air, Injector |
| Not Shown | 1 | 19608-15 | Disperser, Commercial 1 1/2” 2850/2900/9500 |

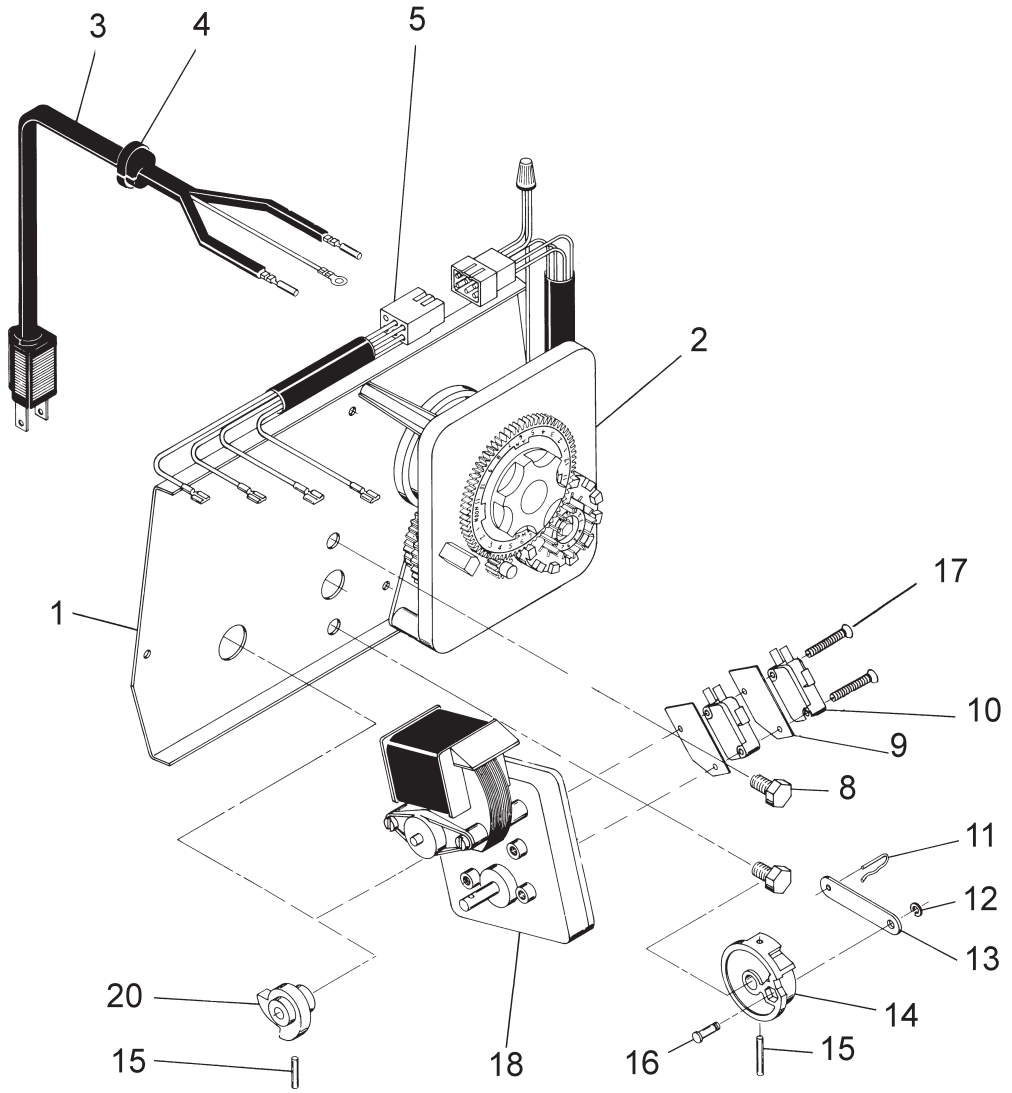
**Optional Side Mount:**

| | | | |
|---|---|---|---|
| 17 | 1 | 40316 | Adapter, Sidemount |
| 18 | 1 | 40368 | O-ring, -160, Sidemount, Flange |
| 19 | 1 | 40372 | O-ring, -142 |
| 20 | 1 | 40310 | Base, 2850/2900/3930, Rotating |
| 21 | 7 | 19768 | Screw, Hex Hd, 3/8-16x1, Cap 18-8 |
| 22 | 7 | 40375 | Washer, Flat, 3/8, Type A, N-SERS |

*** Do not use O-ring if control is side mounted.**

**For Service Assembly Numbers, See the Back of this Manual**

# *Powerhead Assembly (Designer)*




61502_2510REVB

**Motor drawing may not resemble actual.**
**For Service Assembly Numbers, See the Back of this Manual**

# *Powerhead Assembly (Designer)*

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 40264 | Backplate, SS/Service Valve Operator, W-T-Screws |
| 2 | 1 | | 3200, Timer 7 or 12 Day |
| 3 | 1 | 11838 | Power Cord |
| 4 | 1 | 13547 | Strain Relief |
| 5 | 1 | 40400 | Harness, Drive, Designer/Environmental |
| 8 | 2 | 10231 | Screw - Drive Mounting |
| 9 | 2 | 10302 | Insulator |
| 10 | 2 | 10218 | Switch |
| 11 | 1 | 10909 | Connecting Link Pin |
| 12 | 1 | 10250 | Retaining Ring |
| 13 | 1 | 10621 | Connecting Link |
| 14 | 1 | 60160-15 | Drive Cam Assy, STF, Blue, includes Items 11, 12, 13, 14 |
| 15 | 2 | 10338 | Roll Pin |
| 16 | 1 | 13366 | Drive Bearing |
| 17 | 2 | 14923 | Screw - Switch Mounting |
| 18 | 1 | 41543* | Motor, Drive, 115V, 50/60Hz |
| | | 42579** | Motor, Drive, 24VAC/VDC, 50/60Hz |
| | | 41545* | Motor, Drive, 230V, 50/60Hz |
| 20 | 1 | 12777 | Brine Valve Cam - Separate Time Fill (Black) |

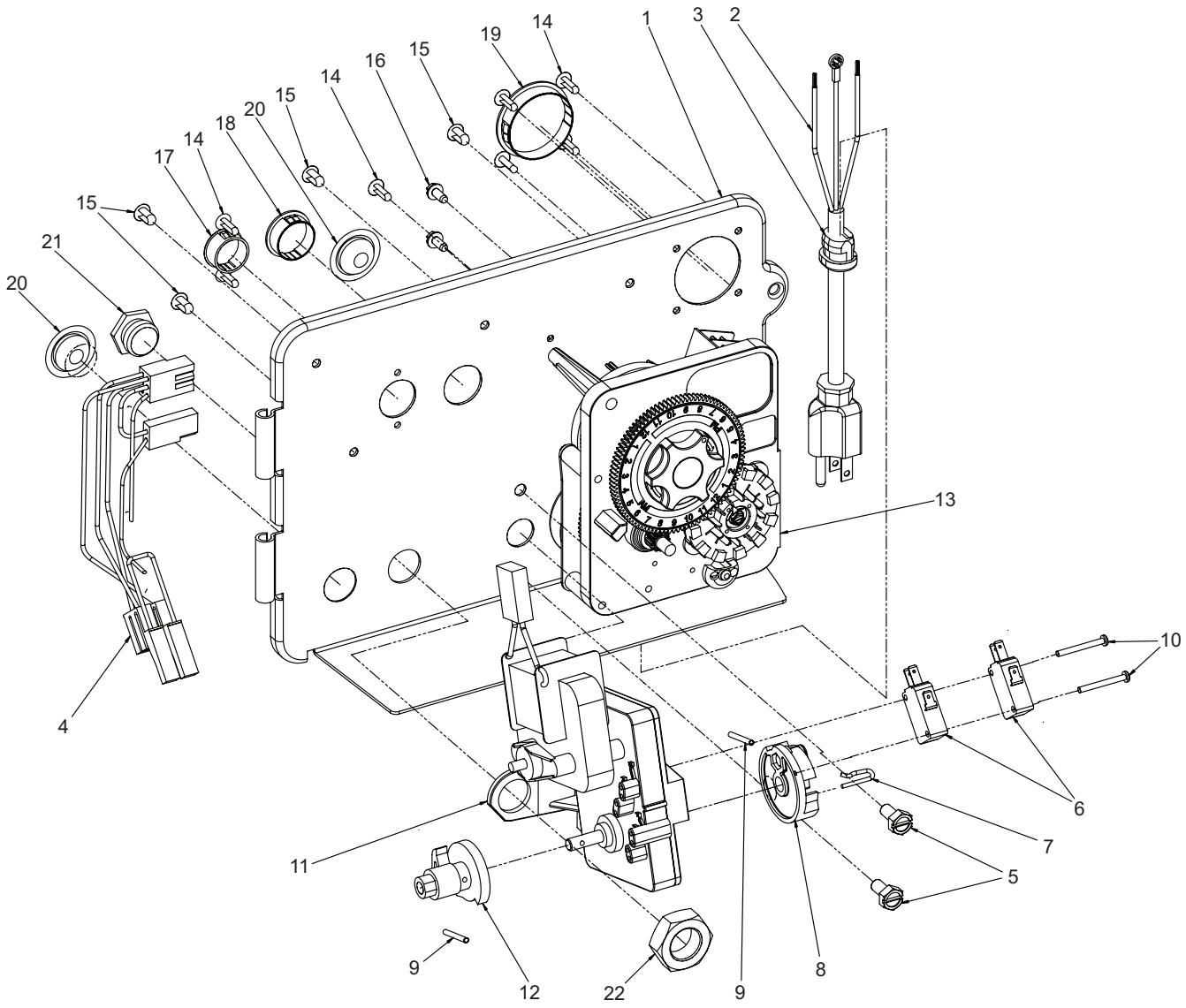
**Not Shown:**

| | | | |
|---|---|---|---|
| | 2 | 10300 | Screw - Timer Mounting |
| | 1 | 13741 | Hole Plug |
| | 1 | 17904 | Hole Plug |
| | 2 | 19367 | Screw, Thumb |
| | 1 | 17470 | Cable Guide Assy, 3/4” |
| | 1 | 17741 | Meter Cable, 16.5” |
| | 1 | 60232-110 | Cover, Designer, 1 Pc. Black |

* Bracket is integrated into the motor.
** Bracket is integrated into the motor and picture may not reflect actual component.

**Motor drawing may not resemble actual.**
**For Service Assembly Numbers, See the Back of this Manual**

# *Environmental Powerhead Assembly*




61501-2850 REVB

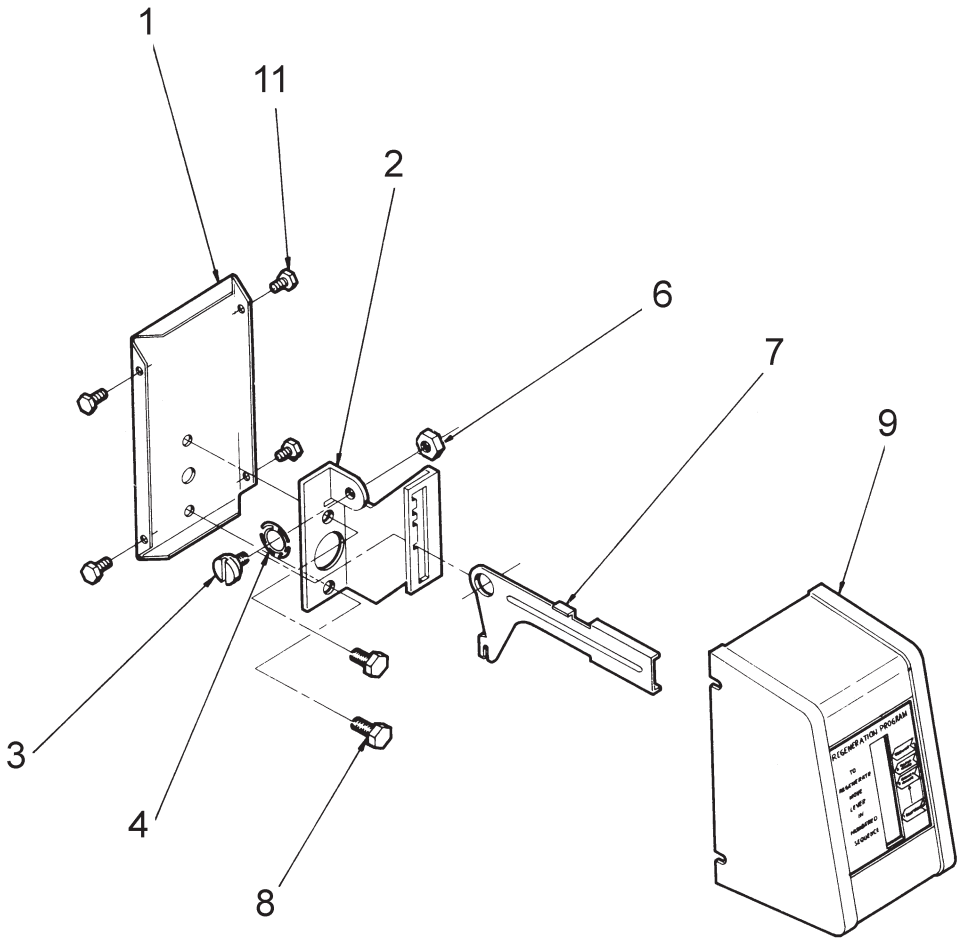
**For Service Assembly Numbers, See the Back of this Manual**

# Environmental Powerhead Assembly Parts List

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 18697-13 | Backplate, Hinged |
| 2 | 1 | 11838 | Power Cord, 6' Fleck |
| 3 | 1 | 13547 | Strain Relief, Cord |
| 4 | 1 | 40400 | Harness, Drive, Designer/Enviromental |
| 5 | 2 | 10231 | Scrw, Slot Hex, 1/4-20 x 1/2 |
| 6 | 2 | 10218 | Switch, Micro |
| 7 | 1 | 10909 | Pin, Connecting Rod Spring |
| 8 | 1 | 60160-15 | Drive Cam Assy, STF, Blue, 2900 |
| 9 | 2 | 10338 | Pin, Roll, 3/32 x 7/8 |
| 10 | 2 | 14923 | Screw, Pan HD Mach, 4-40 x 1 |
| 11 | 1 | 41543 | Motor, Drive, 115V/60HZ |
| 12 | 1 | 12777 | Cam, Shut-off Valve |
| 13 | 1 | 61502-3200 | Timer Assy, 3200 Clock |
| 14 | 7 | 19800 | Plug (Hole Size: Dia .140) |
| 15 | 4 | 19801 | Plug, Dia .190 |
| 16 | 2 | 10300 | Screw, Hx Wash Head, 8 x 3/8 |
| 17 | 1 | 15806 | Hole Plug, Heyco |
| 18 | 1 | 16493 | Plug, Hole, Heyco, .88 Dia |
| 19 | 1 | 40306 | Plug, 1.50 Hole, Dome, Heyco |
| 20 | 2 | 19691 | Plug, .750 Dia. Hole, Flush |
| 21 | 1 | 10712 | Fitting, Brine Valve |
| 22 | 1 | 10269 | Nut, Jam, 3/4-16 |

**For Service Assembly Numbers, See the Back of this Manual**

# Manual Powerhead Assembly



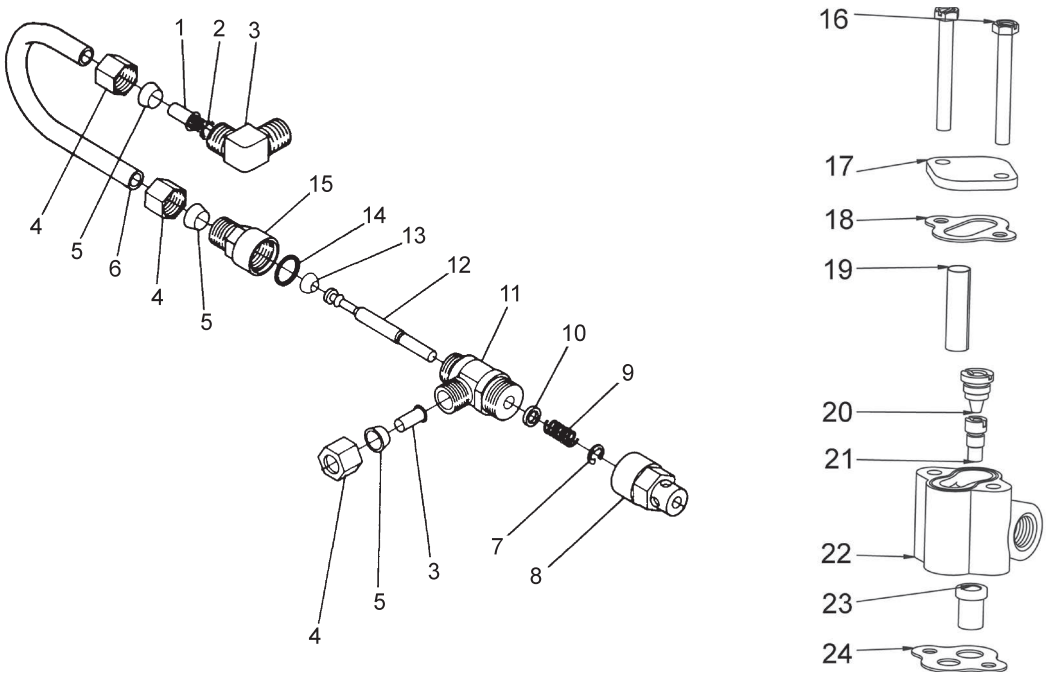

60409REVA

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 12593 | Backplate, Manual |
| 2 | 1 | 12592 | Bracket, Lever Position |
| 3 | 1 | 12596 | Screw, Spec Mach, 1/4 - 20 x 1/2 |
| 4 | 1 | 12707 | Washer, Spring |
| 6 | 1 | 11235 | Nut, Hex, 1/4 - 20, Mach Screw, Zinc |
| 7 | 1 | 12594 | Lever, Valve Position |
| 8 | 2 | 10231 | Screw, Slot Hex, 1/4 - 20 x 1/2 18-8 SS |
| 9 | 1 | 60224-32 | Cover Assy, Manual, Filter |
| | 1 | 60224-33 | Cover Assy, Manual, Softener |
| 11 | 4 | 10300 | Screw, Slot Hex Wsh, 8-18 x 3/8 Type “B” RC44-47 |

**Not Shown:**

| | | | |
|---|---|---|---|
| | 1 | 10909 | Pin, Link |

**For Service Assembly Numbers, See the Back of this Manual**

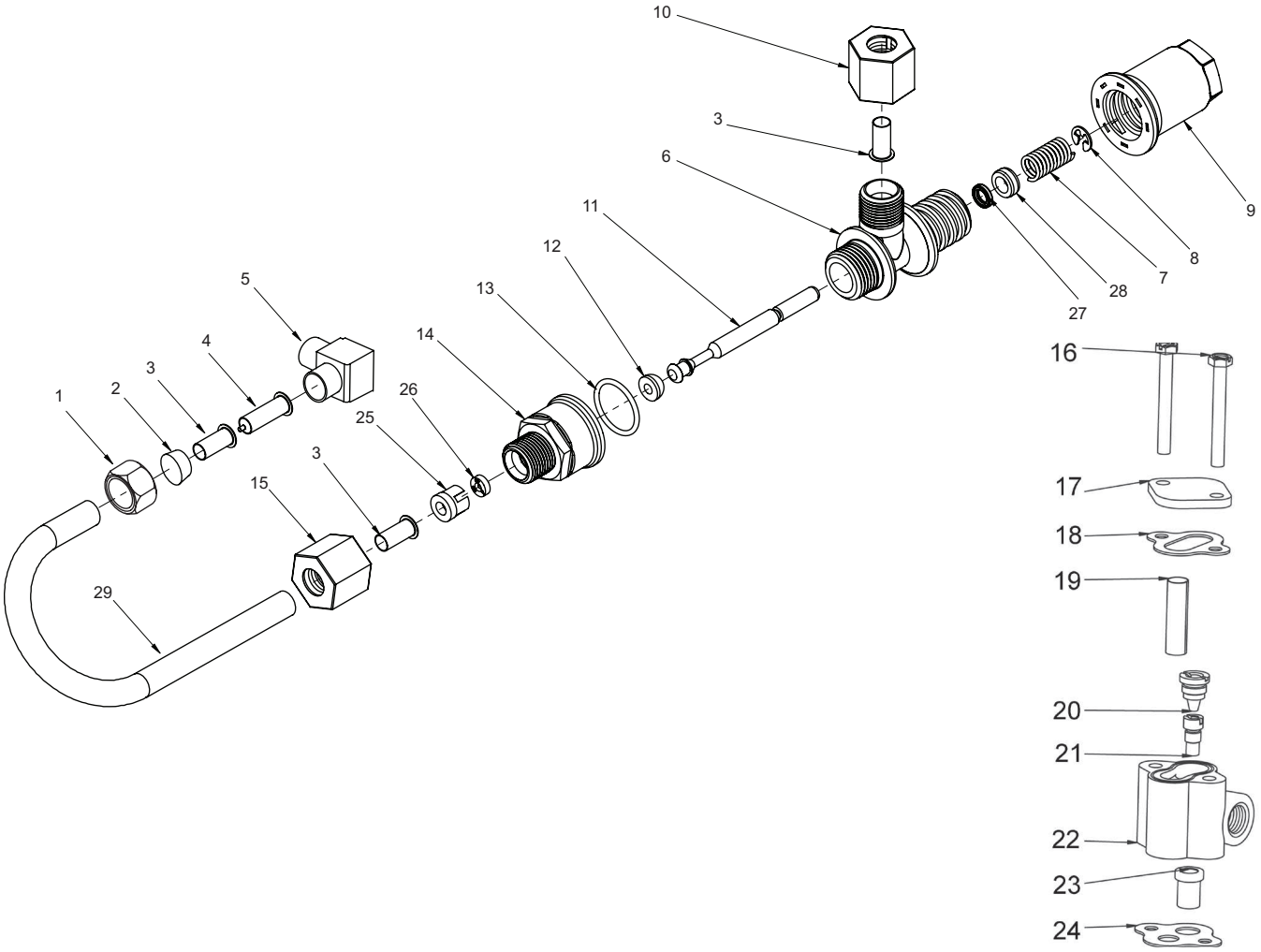



60029

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 2 | 10332 | Fitting, Insert, 3/8 |
| 2 | 1 | 12767 | Screen, Brine |
| 3 | 1 | 10328 | Fitting, Elbow, 90 Deg. 1/4 PT x 3/8Tube |
| 4 | 3 | 10329 | Fitting, Tube, 3/8 Nut, Brass |
| 5 | 3 | 10330 | Fitting, Sleeve, 3/8 Celcon |
| 6 | 1 | 16508 | Tube, Brine, 1600, PVC |
| | 1 | 16508-01 | Tube, Brine Valve, 2850/2900s |
| | 1 | 12774 | Tube, Brine Valve, 1500 |
| | 1 | 40027 | Tube, Brine Valve, 2510 |
| | 1 | 15221 | Tube, Brine Valve, 2750/2900 |
| | 1 | 42184 | Tube, Brine Valve, 2850s |
| | 1 | 41683* | Tube, Brine Valve, UF, 1600/1650 |
| 7 | 1 | 10250 | Ring, Retaining |
| 8 | 1 | 11749 | Guide, Brine Valve Stem |
| 9 | 1 | 10249 | Spring, Brine Valve |
| 10 | 1 | 12550 | Quad Ring, -009 |
| 11 | 1 | 12748 | Brine Valve Body Assy, 1600 w/Quad Ring |
| 12 | 1 | 12552-02 | Brine Valve Stem, 1600, with seat |
| 13 | 1 | 12626 | Seat, Brine Valve |
| 14 | 1 | 11982 | O-ring, -016 |
| 15 | 1 | 60020-25 | BLFC, .25 GPM, 1600 |
| | 1 | 60020-50 | BLFC, .50 GPM, 1600 |
| | 1 | 60020-100 | BLFC, 1.0 GPM, 1600 |
| 16 | 2 | 10692 | Screw, Slot Hex Hd, 10 - 24X 18-8 Stainless Steel |
| 17 | 1 | 11893 | Cap, Injector, SS |
| 18 | 1 | 10229 | Gasket, Injector Cap, 1600 |
| 19 | 1 | 10227 | Screen, Injector |
| 20 | 1 | 10913-xx | Nozzle, Injector, -xx is for injector size |
| 21 | 1 | 10914-xx | Throat, Injector, -xx is for injector size |
| 22 | 1 | 17776 | Body, Injector, 1600 |
| | 1 | 17776-02* | Body, Injector, 1600 Upflow |
| 23 | 1 | 16221 | Disperser, Air |
| 24 | 1 | 14805 | Gasket, Injector Body, 1600/1700 |

*Upflow Only

# 1650 Brine System Assembly




60011_REV C

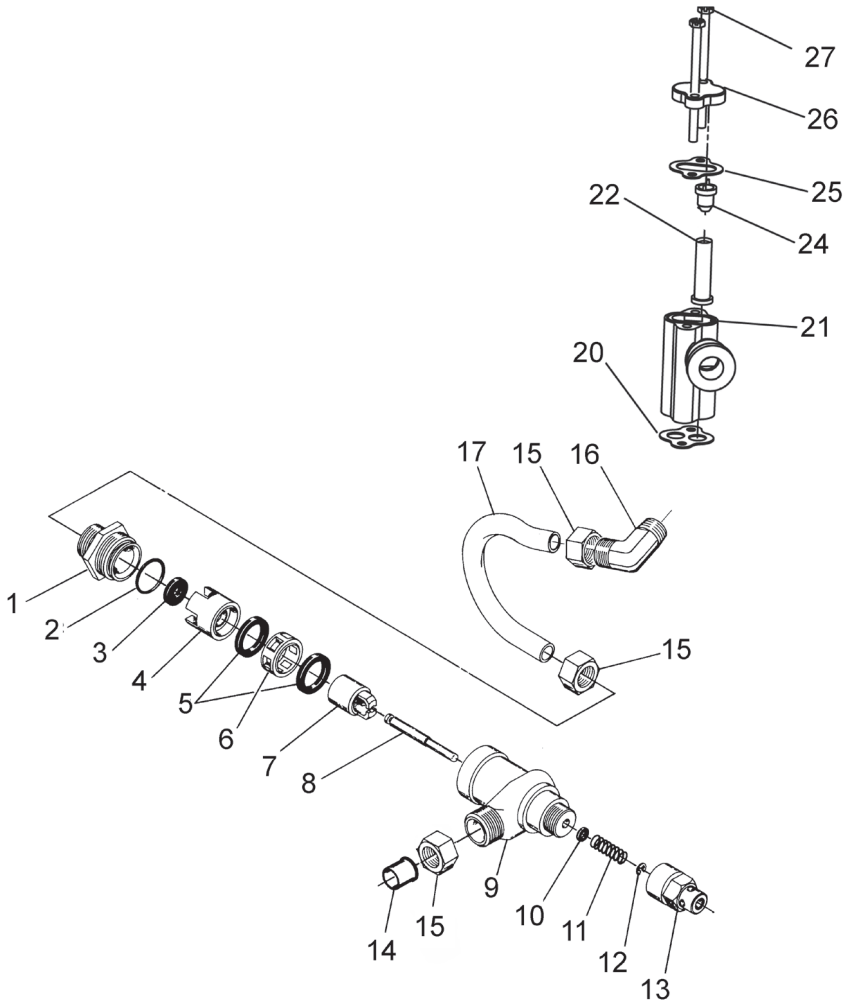
**For Service Assembly Numbers, See the Back of this Manual**

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 10329 | Fitting, Tube, 3/8 Nut, Brass |
| 2 | 1 | 10330 | Fitting, Sleeve, 3/8 Celcon |
| 3 | 3 | 10332 | Fitting, Insert, 3/8 |
| 4 | 1 | 12767 | Screen, Brine |
| 5 | 1 | 10328 | Fitting, Elbow, 90 Deg 1/4 NPT x 3/8T |
| 6 | 1 | 17884 | Brine Valve Body Assy, 1650 |
| 7 | 1 | 10249 | Spring, Brine Valve |
| 8 | 1 | 10250 | Ring, Retaining |
| 9 | 1 | 17906 | Guide, Brine Valve Stem |
| 10 | 1 | 19625 | Nut Assy, 3/8", Plastic |
| 11 | 1 | 12552-02 | Brine Valve Stem, 1600 |
| 12 | 1 | 12626 | Seat, Brine Valve |
| 13 | 1 | 16924 | O-ring, -018 |
| 14 | 1 | 60010-25 | BLFC, 1650, .25 GPM, Plastic |
| | 1 | 60010-50 | BLFC, 1650, .50 GPM, Plastic |
| | 1 | 60010-100 | BLFC, 1650, 1.0 GPM, Plastic |
| 15 | 1 | 19625 | Nut Assy, 3/8", Plastic |
| 16 | 2 | 10692 | Screw, Slot Hex Hd, 10 - 24X 18-8 Stainless Steel |
| 17 | 1 | 11893 | Cap, Injector, Stainless Steel |
| 18 | 1 | 10229 | Gasket, Injector Cap, 1600 |
| 19 | 1 | 10227 | Screen, Injector |
| 20 | 1 | 10913-xx | Nozzle, Injector, -xx is for injector size |
| 21 | 1 | 10914-xx | Throat, Injector, -xx is for injector size |
| 22 | 1 | 17776 | Body, Injector, 1600 |
| | 1 | 17776-02* | Body, Injector, 1600 Upflow |
| 23 | 1 | 16221 | Disperser, Air |
| 24 | 1 | 14805 | Gasket, Injector Body, 1600/1700 |
| 25 | 1 | 12098 | Retainer, Flow Control |
| 26 | 1 | 12095 | Washer, Flow Control .50 GPM |
| | 1 | 12094 | Washer, Flow Control .25 GPM |
| | 1 | 12097 | Washer, Flow Control 1.0 GPM |
| 27 | 1 | 12550 | Quad Ring -009 |
| | 1 | 12550-01 | Quad Ring -009 560CD |
| 28 | 1 | 17908 | Sleeve, Brine Valve Stem |
| 29 | 1 | 16508-01 | Tube, Brine Valve, 2850/1600 |
| | 1 | 40027 | Tube, Brine Valve, 2510 |
| | 1 | 42184 | Tube, Brine Valve, 2850s |
| | 1 | 12774 | Tube, Brine Valve, 1500 |
| | 1 | 15221 | Tube, Brine Valve, 2750 |
| | 1 | 41683* | Tube, Brine Valve, UF, 1600/1650 |

*Upflow Only

**For Service Assembly Numbers, See the Back of this Manual**

# 1700 Brine System Assembly




60034_REVB

**For Service Assembly Numbers, See the Back of this Manual**

# 1700 Brine System Assembly

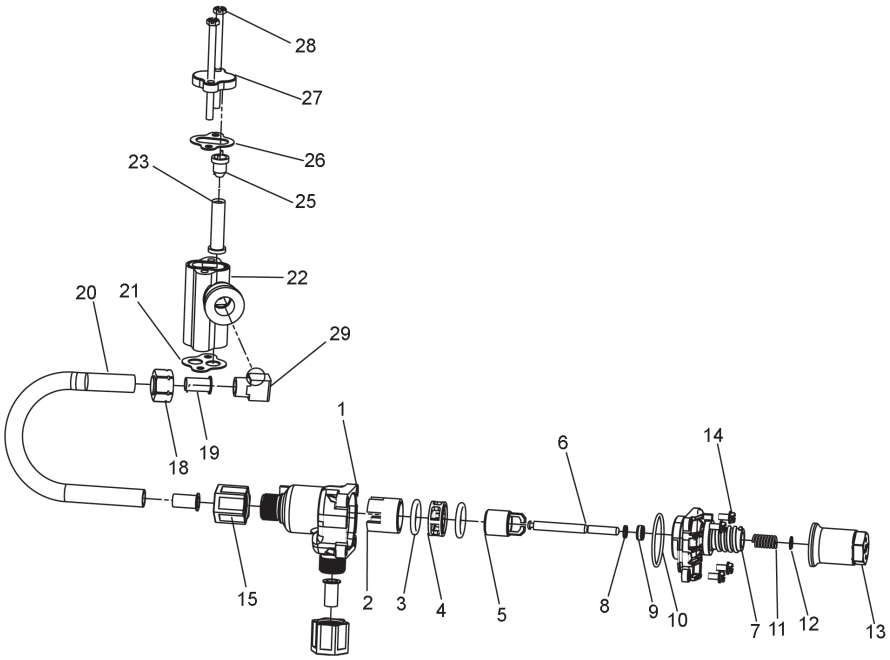
| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 14792 | Plug, End, Brine Valve |
| 2 | 1 | 13201 | Quad Ring, -020 |
| 3 | 1 | 12085 | Washer, Flow, 1.2 GPM |
| | 1 | 12086 | Washer, Flow, 1.5 GPM |
| | 1 | 12087 | Washer, Flow, 2.0 GPM |
| | 1 | 12088 | Washer, Flow, 2.4 GPM |
| | 1 | 12089 | Washer, Flow, 3.0 GPM |
| | 1 | 12090 | Washer, Flow, 3.5 GPM |
| | 1 | 12091 | Washer, Flow, 4.0 GPM |
| | 1 | 12092 | Washer, Flow, 5.0 GPM |
| 4 | 1 | 14785 | Retainer, Flow Control |
| 5 | 3 | 14811 | O-ring, -210, 560CD, Brine |
| 6 | 1 | 14798 | Spacer, 1700, Brine |
| 7 | 1 | 14795 | Piston, Brine Valve |
| 8 | 1 | 14797 | Brine Valve Stem |
| 9 | 1 | 14790 | Brine Valve Body |
| 10 | 1 | 12550 | Quad Ring, -009 |
| 11 | 1 | 15310 | Spring, Brine Valve |
| 12 | 1 | 10250 | Retaining Ring |
| 13 | 1 | 15517 | Guide, Stem |
| 14 | 1 | 15415 | Fitting, Insert, 1/2”, Tube |
| 15 | 3 | 15414 | Nut, 2900, w/Sleeve |
| 16 | 1 | 15413 | Fitting, Elbow, Male, 1/2T x 3/8 NPT |
| 17 | 1 | 15416 | Tube, Brine, 2900/2750 |
| | 1 | 16460 | Tube, Brine, 2850/2900s |
| | 1 | 41447* | Tube, Brine, 2900s, U/F |
| | 1 | 42183 | Tube, Brine, 1700, 2850s |
| 20 | 1 | 14805 | Gasket, Injector Body 1600/1700 |
| 21 | 1 | 17777 | Body, Injector, 1700 |
| | 1 | 17777-02* | Body, Injector, 1700 U/F |
| 22 | 1 | 14802-xxc | Throat, Injector, -xxc is for Injector Size |
| 24 | | 14801-xxc | Nozzle, Injection, -xxc is for Injector Size |
| 25 | 1 | 10229 | Gasket, Injector Cap, 1600 |
| 26 | 1 | 11893 | Cap, Injector, Stainless Steel |
| | 1 | 10228 | Cap, Injector |
| 27 | 2 | 14804 | Screw, Hex Hd Mach, 10 - 24 x 2-3/4” 18-8 Stainless Steel |
| **Not Shown:** | | | |
| | 1 | 16974 | Fitting, Plastic, Female, 3/4 x 3/4 Slip |
| | 1 | 17996 | Disperser, Air, Injector |

*Upflow Only

**NOTE:** Item number 26 (11893) is used on injector sizes 2 through 5C. Part number 10228 is used on injector sizes 6C.

**For Service Assembly Numbers, See the Back of this Manual**

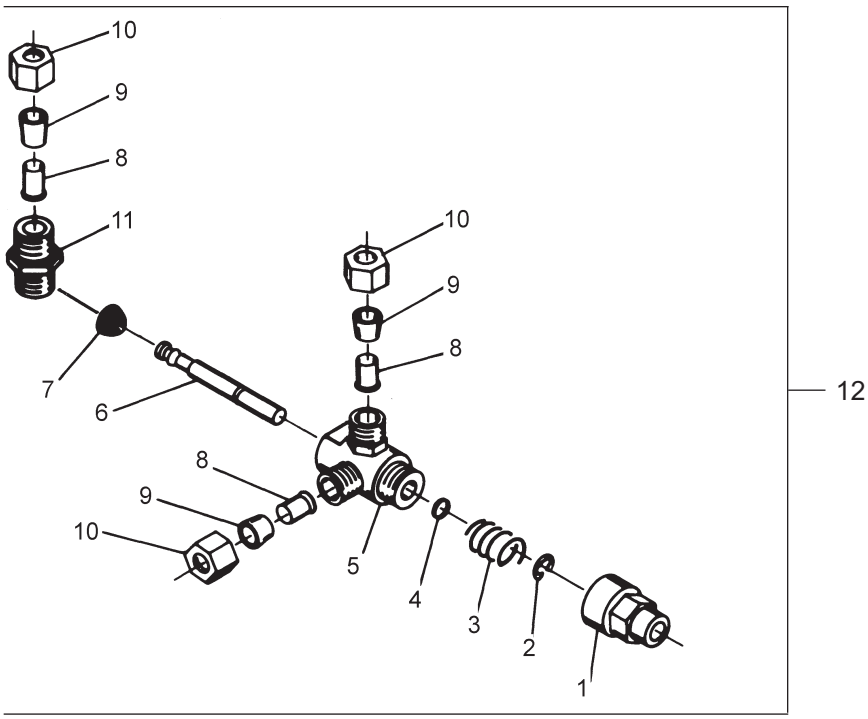
# 1710 Brine System Assembly




| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 41202 | Brine Valve, 1700, Plastic, Top |
| 2 | 1 | 14785-01 | Retainer, Flow Control |
| 3 | 1 | 14811 | O-Ring, -210, 560CD, Brine |
| 4 | 1 | 14798 | Spacer, 1700, Brine |
| 5 | 1 | 14795 | Piston, Brine Valve |
| 6 | 1 | 41203 | Stem, Brine, 1710, Plastic, 2900 |
| 7 | 1 | 41201 | Brine Valve, 1700, Plastic, Bottom |
| 8 | 5 | 17908 | Sleeve, Brine Valve Stem |
| 9 | 1 | 12550 | Quad Ring, -009 |
| 10 | 3 | 41547 | O-Ring, 2mmx35mm |
| 11 | 2 | 15310 | Spring, Brine Valve |
| 12 | 2 | 10250 | Ring, Retaining |
| 13 | 1 | 17906 | Guide, Brine Valve Stem |
| 14 | 2 | 14202-01 | Screw, Hex Wsh Mach, 8-32 X 5/16 18-8 Stainless Steel |
| 15 | 2 | 41056 | Nut Assembly, 1/2” Plastic |
| Not Shown | 1 | 19151 | Washer, Flow, 1.0 Gpm |
| 18 | 1 | 15414 | Nut, 2900, w/Sleeve |
| 19 | 1 | 15415 | Fitting, Insert, 1/2”, Tube |
| 20 | 1 | 16460 | Tube, Brine, 2850, 2900s |
| | 1 | 42183 | Tube, Brine, 2850s |
| | 1 | 15416 | Tube, Brine, 2900/2750 |
| | 1 | 41447 | Tube, Brine, 2900s U/F |
| 21 | 1 | 19925 | Gasket, Injector Body, 1700 |
| 22 | 1 | 17777 | Body, Injector, 1700 |
| 23 | 1 | 14802-xxc | Throat, Injector, -xxc is Injector Size |
| 25 | 1 | 14801-xxc | Nozzle, Injector, -xxc is Injector Size |
| 26 | 1 | 10229 | Gasket, Injector Cap, 1600 |
| 27 | 1 | 10228 | Cap, Injector |
| 28 | 2 | 14804 | Screw, Hex Head Mach, 10 - 24 x 2-3/4 18-8 Stainless Steel |
| 29 | 1 | 15413 | Fitting, Elbow, Male, 1/2T X 3/8NPT |

**For Service Assembly Numbers, See the Back of this Manual**

# 1600 Service Valve Operator Assembly (Old Style)

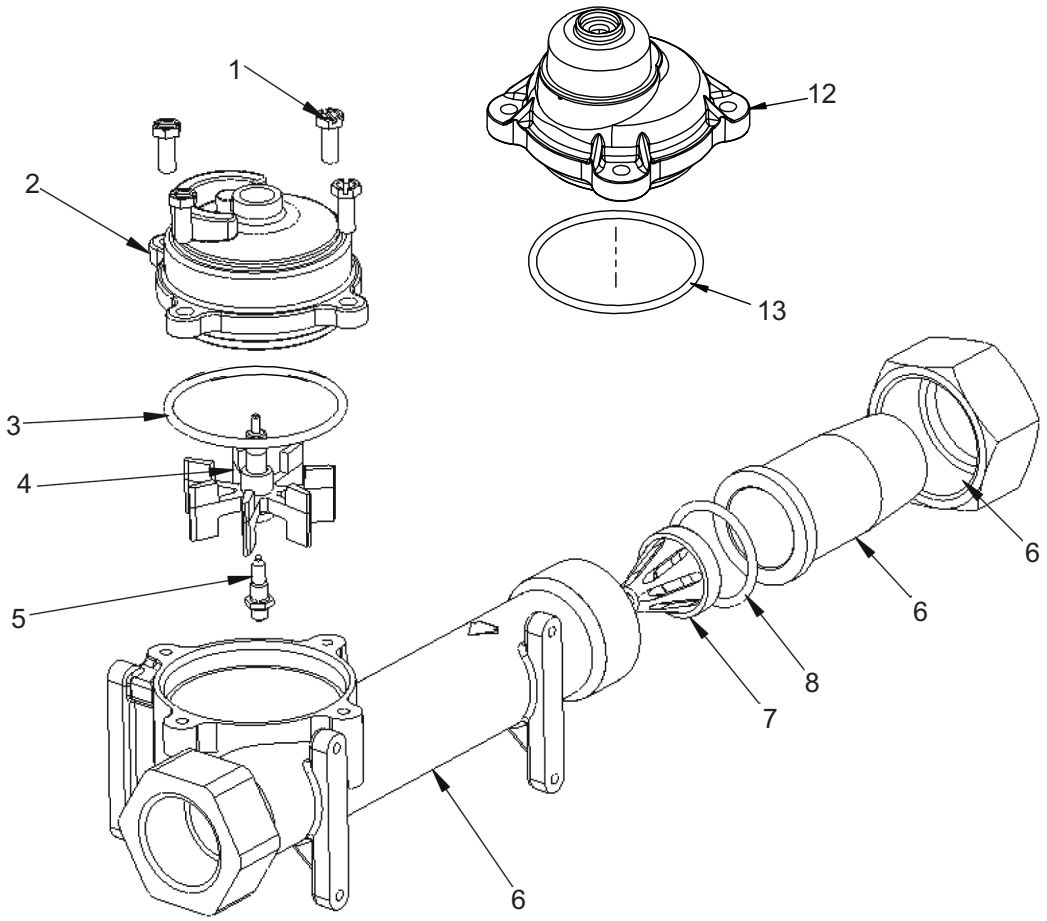



60150_REVA

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 11749 | Guide, Brine Valve Stem |
| 2 | 1 | 10250 | Ring, Retaining |
| 3 | 1 | 10249 | Spring, Brine Valve |
| 4 | 1 | 12550 | Quad Ring, -009 |
| 5 | 1 | 10785 | SVO Body Assy Brass Valves |
| 6 | 1 | 12552-02 | Brine Valve Stem, 1600, w/Seat |
| 7 | 1 | 12626 | Seat, Brine Valve |
| 8 | 3 | 10332 | Fitting, Insert, 3/8 |
| 9 | 3 | 10330 | Fitting, Sleeve, 3/8 Celcon |
| 10 | 3 | 10329 | Fitting, Tube, 3/8 Nut, Brass |
| 11 | 1 | 10331 | Fitting, Compression, 1/4” x 3/8” |
| 12 | 1 | 60150 | Service Valve Operator, Assy, 1600, Old Style, Complete |

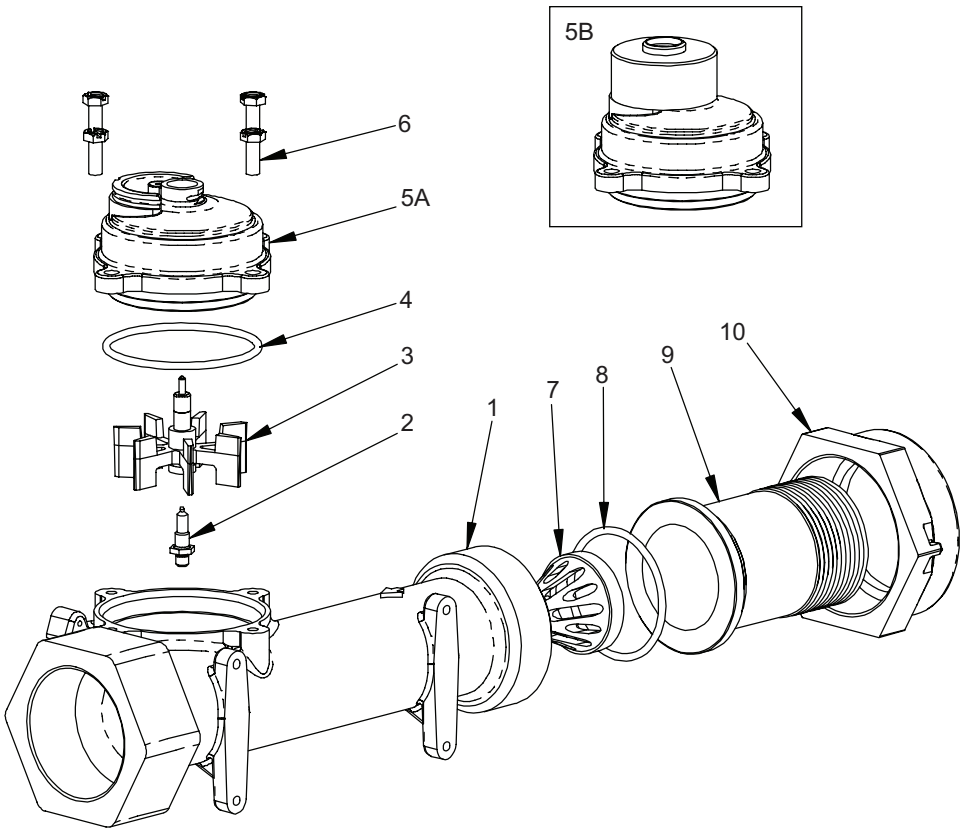
**For Service Assembly Numbers, See the Back of this Manual**

# 1” Meter Assembly




60391REVD

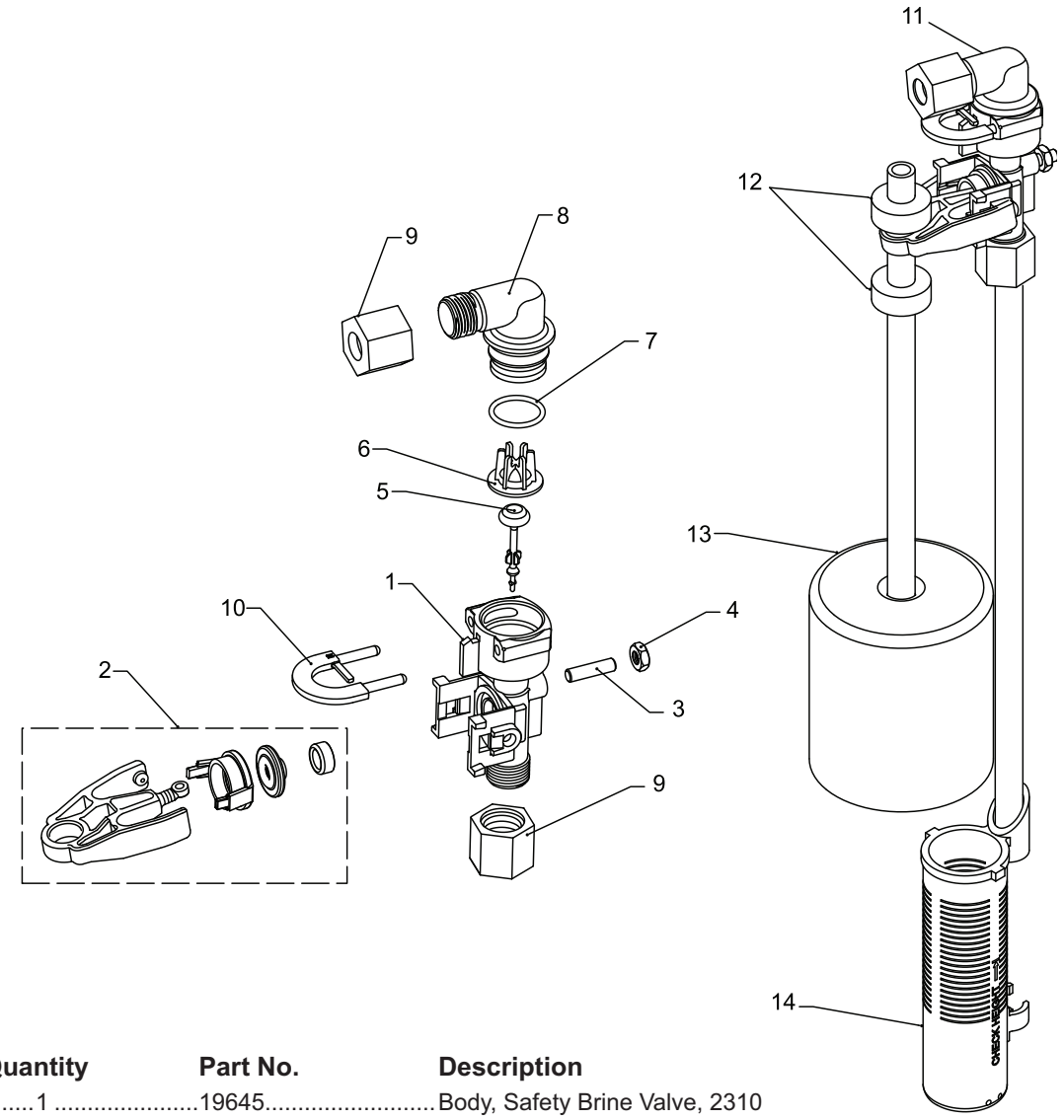
| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 4 | 12112 | Screw, Slotted Hex Head, #10 - 24 x .50 |
| 2 | 1 | 14038 | Cap, Meter, STD Range, Plastic |
| | 1 | 40986 | Cap Meter |
| 3 | 1 | 13847 | O-ring, -137 |
| 4 | 1 | 13509 | Impeller, Meter |
| | 1 | 13509-01 | Impeller, Celcon |
| 5 | 1 | 13882 | Post, Meter Impeller |
| 6 | 1 | 14959 | Body, Meter, 27550 |
| | 1 | 60628NP | Meter Assy, 1”, NP |
| | | 14959 | Body, Meter, 2750 |
| | | 14961 | Fitting, Nipple, 1”, Quick Connect |
| | | 14962 | Nut, 1” Meter, Quick Connect |
| 7 | 1 | 14960 | Flow Straightener |
| 8 | 1 | 13287 | O-ring, 123 |
| 12 | 1 | 15150 | Meter Cap Assy, Ext, Range, Plastic |
| 13 | 1 | 13847 | O-ring, -137 |
| **Not Shown** | | | |
| | 1 | 15218 | Meter Cap Assy, STD Range, Brass |
| | 1 | 15237 | Meter Cap Assy, EXT Range, Brass |



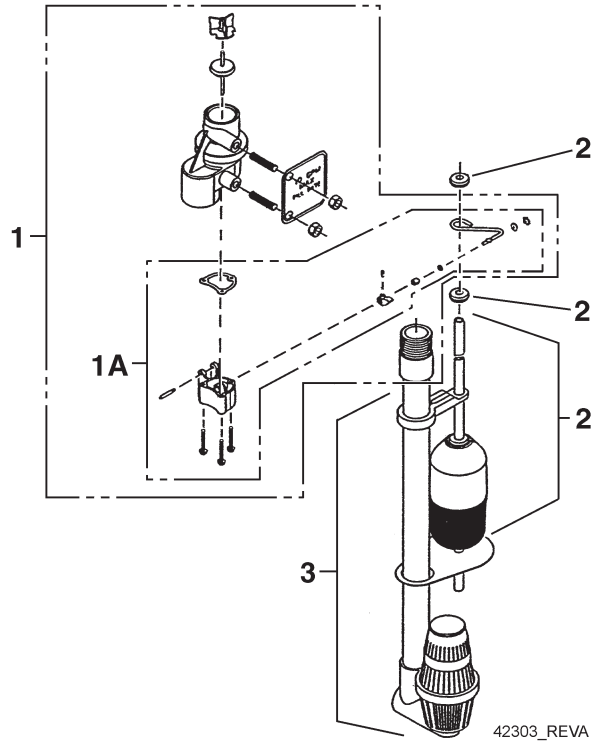

60610 REVC

| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 17569 | Body, Meter, 2850/9500 |
| 2 | 1 | 13882 | Post, Meter Impeller |
| 3 | 1 | 13509 | Impeller, Meter |
| 4 | 1 | 13847 | O-Ring, -137, Std/560CD, Meter |
| 5A | 1 | 14038 | Meter Cap Assy, STD Range, Plastic |
| 5B | 1 | 15150 | Meter Cap Assy, Ext Range, Plastic |
| 6 | 4 | 12112 | Screw, Hex Hd Mach, 10-24 x 1/2 18-8 Stainless Steel |
| 7 | 1 | 17542 | Flow Straightener, 1-1/2” |
| 8 | 1 | 12733 | O-Ring, -132 |
| 9 | 1 | 17544 | Fitting, 1-1/2” Quick Connector |
| 10 | 1 | 17543 | Nut, 1-1/2”, Q/C |
| **Not Shown** | | | |
| | 1 | 17790 | Sleeve, Meter, 1 1/2” x 1” |
| | 1 | 15218 | Meter Cap Assy, STD Range, Brass |
| | 1 | 15237 | Meter Cap Assy, EXT Range, Brass |

# 2310 Safety Brine Valve




| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 19645 | Body, Safety Brine Valve, 2310 |
| 2 | 1 | 19803 | Safety Brine Valve Assy |
| 3 | 1 | 19804 | Screw, Sckt Hd, Set, 10-24 x .75 |
| 4 | 1 | 19805 | Nut, Hex, 10-24, Nylon Black |
| 5 | 1 | 19652-01 | Poppet Assy, SBV w/O-ring |
| 6 | 1 | 19649 | Flow Dispenser |
| 7 | 1 | 11183 | O-ring, -017 |
| 8 | 1 | 19647 | Elbow, Safety Brine Valve |
| 9 | 2 | 19625 | Nut Assy, 3/8” Plastic |
| 10 | 1 | 18312 | Retainer, Drain |
| 11 | 1 | 60014 | Safety Brine Valve Assy, 2310 |
| 12 | 2 | 10150 | Grommet, .30 Dia |
| 13 | 1 | 60068-30 | Float Assy, 2310, w/30” Rod |
| 14 | 1 | 60002-34 | Air Check, #500, 34” Long |

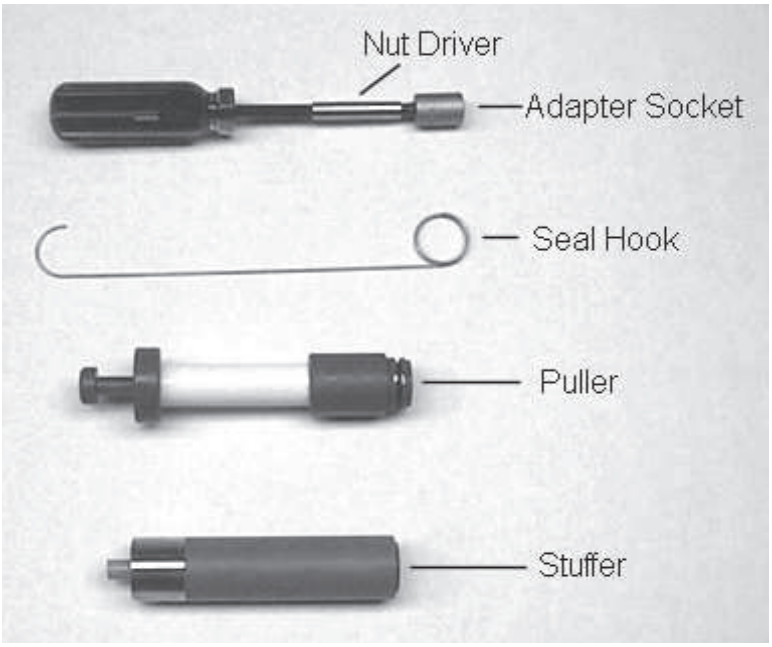



| Item No. | Quantity | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 60038 | Safety Brine Valve, 2350 |
| 1A | 1 | 61024 | Actuator Assy, 2350 Brine |
| 2 | 1 | 60028-30 | Float Assy, 2350, 30” Wht |
| | 1 | 60026-30SAN | Float Assy, 2350, 30” Hot Water |
| 3 | 1 | 60009-00 | Air Check, #900, Commercial Less Fittings |
| | 1 | 60009-01 | Air Check, #900, Commercial, Hot Water Less Fittings |

Not Shown

| | | | |
|---|---|---|---|
| | 1 | 18603 | Fitting Assy, 900 Air Check 2350 |
| | 1 | 18602 | Fitting Assy, 900 Air Check |

# Seal & Spacer Tools & Replacement




**Tools Used in the Seal and Spacer Replacement**

| Description | Part No. |
|---|---|
| Nut Driver | 12664 |
| Socket Adapter | 16906 |
| Socket 7/16” | 12665 |
| Seal Hook | 12874 |
| Puller | 13061, 1500/2510/5600/4650 |
| | 17623, 2850/9500 |
| | 12682, 2900/3180 |
| Stuffer | 11098, 1500/2510/2750 |
| | 12763, 5600/9000/9100/4650 |
| | 12683, 2100/3150 |
| | 16516, 2850/9500 |

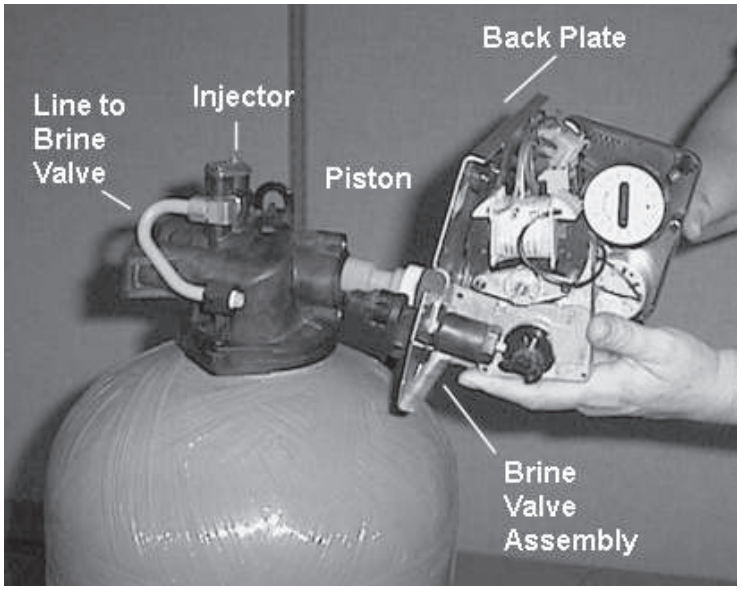



**Figure 5**

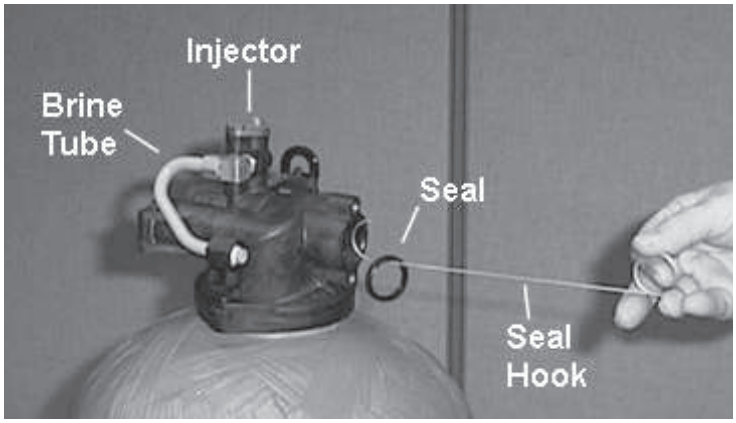



**Figure 6**

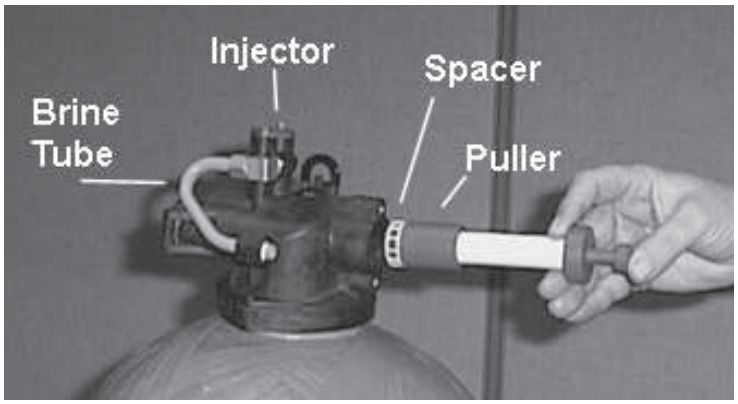



**Figure 7**

**NOTE: Photos shown are for reference only for replacing the seal and spacer. Actual valve may be different.**

1. Turn off water supply to valve. Next, cycle valve to backwash position, then to service. Now remove electrical plug from outlet.
2. Remove control box cover.
3. Disconnect the brine line from the injector housing to the brine valve (if your unit has timed brine tank fill).
4. Remove the two capscrews that hold the back plate to the valve.
5. Grasp the back plate on both sides and slowly pull end plug and piston assembly out of the valve body (see Figure 5) and lay aside.
6. Remove the seal first using the wire hook with the finger loop (see Figure 6).
7. The spacer tool (use only for removing the spacers) has three retractable pins, retained by a rubber ring, at one end. They are retracted or pushed out by pulling or pushing the center button the opposite end.
8. Insert the pin end of the spacer tool into the valve body with the pins retracted (button pulled back). Push the tool tight against the spacer and push the button in, (see Figure 7). When the button is pushed in, the pins are pushed out to engage the 1/4 dia. holes in the spacer. Remove the tool from the valve body. The spacer will be on the end. Pull the center button back, the pins will be retracted and the spacer can be removed from the spacer tool.

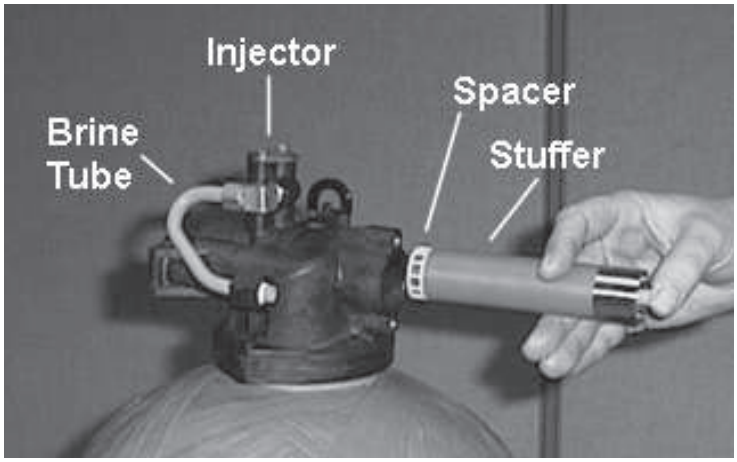



**Figure 8**

9. Alternately remove the remaining seals and spacers in accordance with steps No. 6 and 8.
10. The last or end spacer does not have any holes for the pins of the spacer tool to engage, therefore if the end spacer does not come out on the first try, try again using the wire hook with the finger loop.
11. To replace seals, spacers and end ring, use special tool with the brass sleeve on one end. This is a double-purpose tool (see Figure 8). The male end acts as a pilot to hold the spacers as they are pushed into the valve body and the brass female end is used to insert the seals into the valve body.
12. To restuff a valve body, first take the end ring (the plastic or brass ring without holes), then with your thumb press the button on the brass sleeve end. The large dia. inner portion is now exposed (see Figure 8). Place the end ring on this pilot with the lip on the end ring facing the tool. Push the tool into the valve body bore until it bottoms. While the tool is in the valve body, take a seal and press it into the inside diameter of the exposed brass female end.
13. Remove the tool, turn it end for end and insert it into the valve body bore. While holding the large dia. of the tool, slide it all the way into the valve body bore until it bottoms. Then push the center button to push the seal of the tool and leave it in place in the valve body.
14. Remove the tool from the valve body and push the center on the brass female end to expose the pilot on the opposite end. Place a spacer on this end and insert the spacer and tool into the valve.

| Problem | Cause | Correction |
|---|---|---|
| 1. Water conditioner fails to regenerate. | A. Electrical service to unit has been interrupted | A. Assure permanent electrical service (check fuse, plug, pull chain, or switch) |
| | B. Timer is defective. | B. Replace timer. |
| | C. Power failure. | C. Reset time of day. |
| 2. Hard water. | A. By-pass valve is open. | A. Close by-pass valve. |
| | B. No salt is in brine tank. | B. Add salt to brine tank and maintain salt level above water level. |
| | C. Injector screen plugged. | C. Clean injector screen. |
| | D. Insufficient water flowing into brine tank. | D. Check brine tank fill time and clean brine line flow control if plugged. |
| | E. Hot water tank hardness. | E. Repeated flushings of the hot water tank is required. |
| | F. Leak at distributor tube. | F. Make sure distributor tube is not cracked. Check O-ring and tube pilot. |
| | G. Internal valve leak. | G. Replace seals and spacers and/or piston. |
| 3. Unit used too much salt. | A. Improper salt setting. | A. Check salt usage and salt setting. |
| | B. Excessive water in brine tank. | B. See problem 7. |
| 4. Loss of water pressure. | A. Iron buildup in line to water conditioner. | A. Clean line to water conditioner. |
| | B. Iron buildup in water conditioner. | B. Clean control and add mineral cleaner to mineral bed. Increase frequency of regeneration. |
| | C. Inlet of control plugged due to foreign material broken loose from pipes by recent work done on plumbing system. | C. Remove piston and clean control. |
| 5. Loss of mineral through drain line. | A. Air in water system. | A. Assure that well system has proper air eliminator control. Check for dry well condition. |
| | B. Improperly sized drain line flow control. | B. Check for proper drain rate. |
| 6. Iron in conditioned water. | A. Fouled mineral bed. | A. Check backwash, brine draw, and brine tank fill. Increase frequency of regeneration. Increase backwash time. |
| 7. Excessive water in brine tank. | A. Plugged drain line flow control. | A. Clean flow control. |
| | B. Plugged injector system. | B. Clean injector and screen. |
| | C. Timer not cycling. | C. Replace timer. |
| | D. Foreign material in brine valve. | D. Replace brine valve seat and clean valve. |
| | E. Foreign material in brine line flow control. | E. Clean brine line flow control. |

| Problem | Cause | Correction |
|---|---|---|
| 8. Softener fails to draw brine. | A. Drain line flow control is plugged. | A. Clean drain line flow control. |
| | B. Injector is plugged. | B. Clean injector |
| | C. Injector screen plugged. | C. Clean screen. |
| | D. Line pressure is too low. | D. Increase line pressure to 20 psi |
| | E. Internal control leak | E. Change seals, spacers, and piston assembly. |
| | F. Service adapter did not cycle. | F. Check drive motor and switches. |
| 9. Control cycles continuously. | A. Misadjusted, broken, or shorted switch. | A. Determine if switch or timer is faulty and replace it, or replace complete power head. |
| 10. Drain flows continuously. | A. Valve is not programming correctly. | A. Check timer program and positioning of control. Replace power head assembly if not positioning properly. |
| | B. Foreign material in control. | B. Remove power head assembly and inspect bore. Remove foreign material and check control in various regeneration positions. |
| | C. Internal control leak. | C. Replace seals and piston assembly. |

## General Service Hints For Meter Control

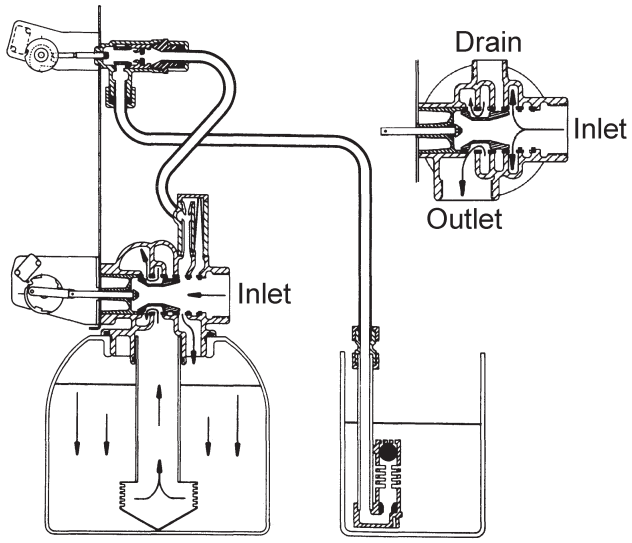
### Problem: Softener delivers hard water

**Reason:** Reserve capacity has been exceeded.
**Correction:** Check salt dosage requirements and reset program wheel to provide additional reserve.

**Reason:** Program wheel is not rotating with meter output.
**Correction:** Pull cable out of meter cover and rotate manually. Program wheel must move without binding and clutch must give positive clicks when program wheel strikes regeneration stop. If it does not, replace timer.

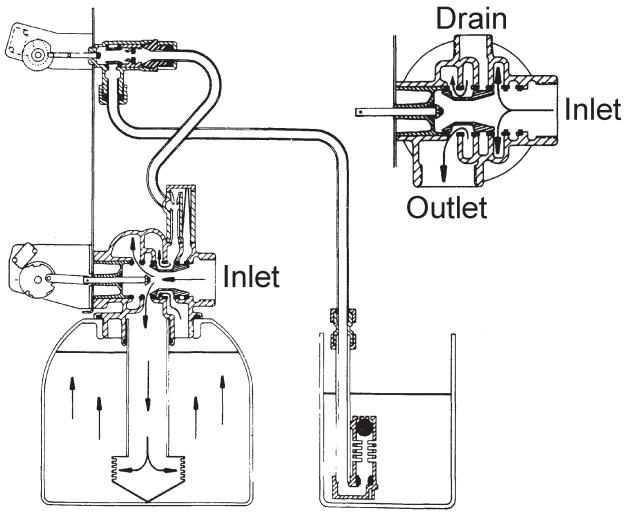
**Reason:** Meter is not measuring flow.
**Correction:** Check meter with meter checker.

## 1 Service Position



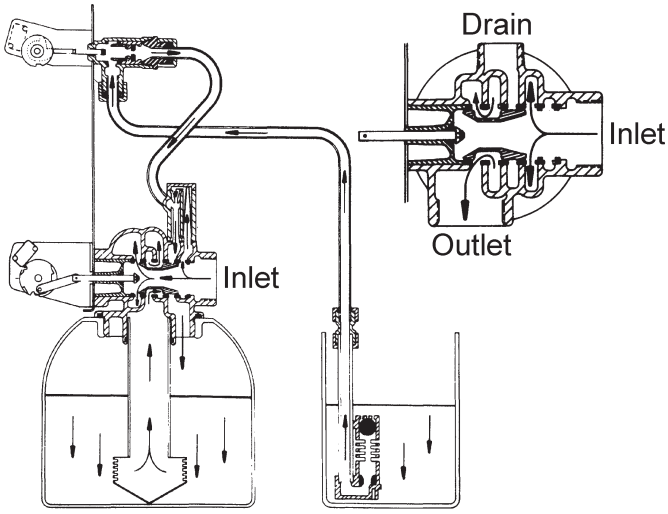

Hard water enters unit at valve inlet and flows down through the mineral in the mineral tank. Conditioned water enters center tube through the bottom distributor, then flows up through the center tube, around the piston, and out the outlet of the valve.

## 2 Backwash Position



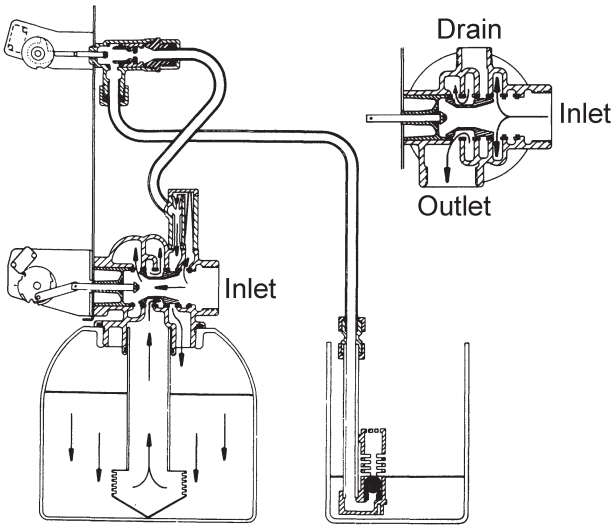

Hard water enters unit at valve inlet, flows through piston, down center tube, through bottom distributor, and up through the mineral, around the piston and out the drain line.

## 3 Brine Position



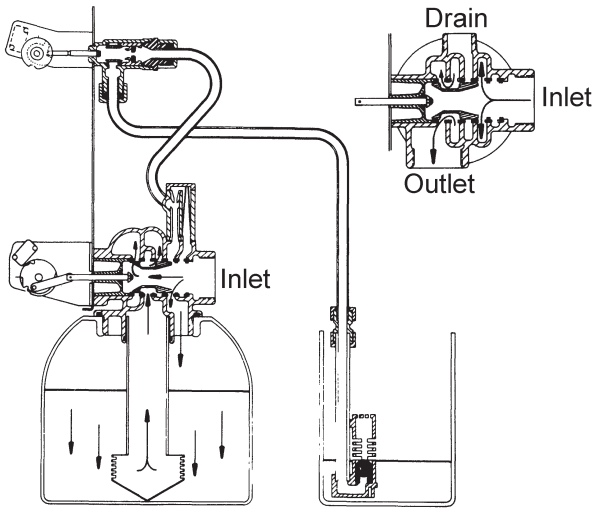

Hard water enters unit at valve inlet, flows up into injector housing and down through nozzle and throat to draw brine from the brine tank, brine flows down through mineral and enters the center tube through bottom distributor and out through the drain line.

## 4 Slow Rinse Position



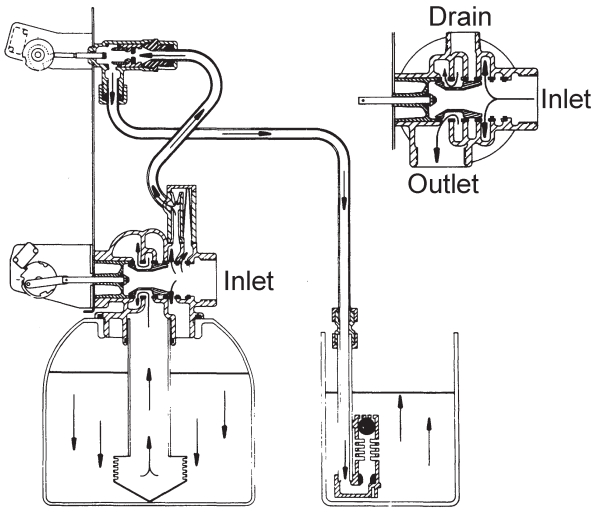

Hard water enters unit at valve inlet, flows up into injector housing and down through nozzle and throat, around the piston, down through mineral, enters center tube through bottom distributor, flows up through center tube, around piston and out through drain line.

## 5 Rapid Rinse

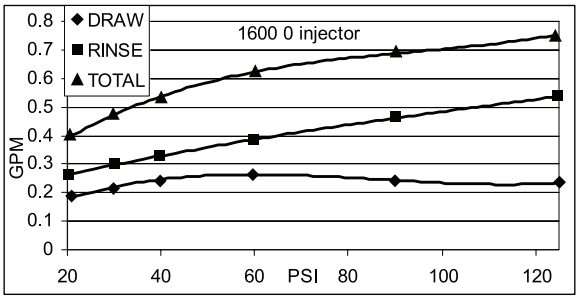


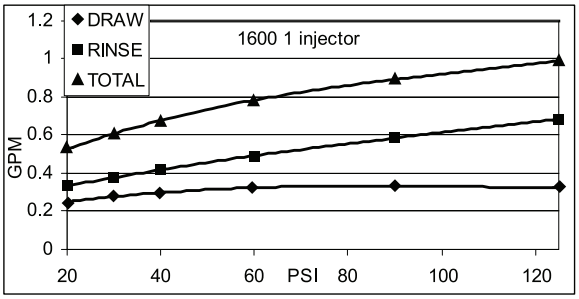

Hard water enters unit at valve inlet, flows directly from inlet down through mineral into center tube bottom distributor and up through center tube, around piston and out through the drain line.

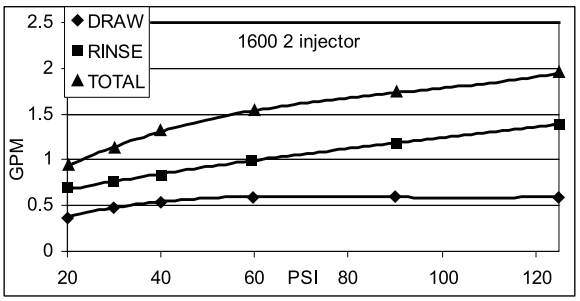
## 6 Brine Tank Refill Position

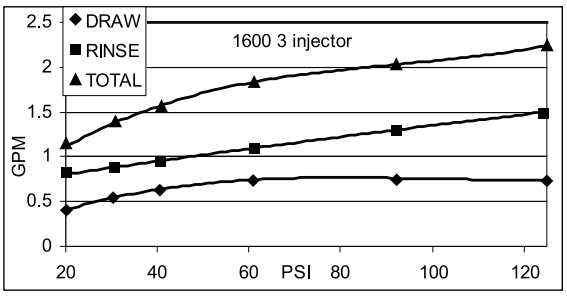


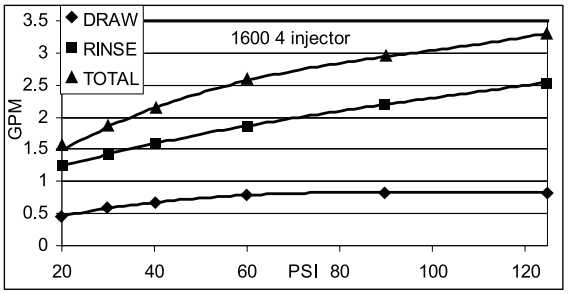

Hard water enters unit at valve inlet, flows up through the injector housing, through the brine valve to refill the brine tank.

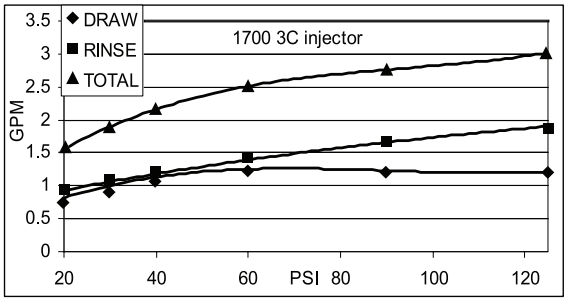


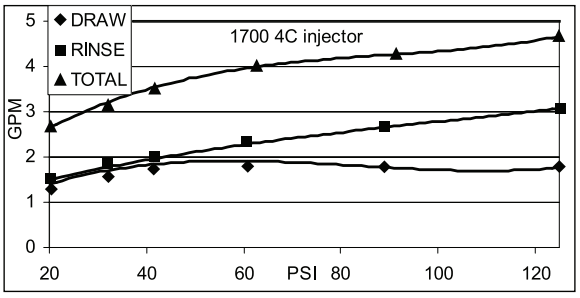



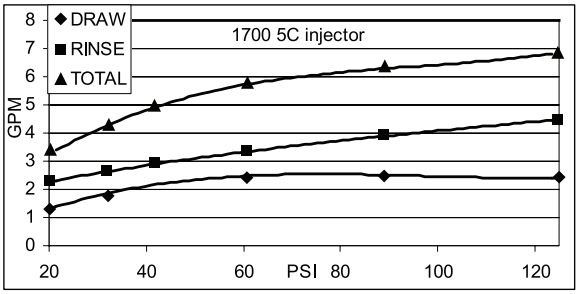



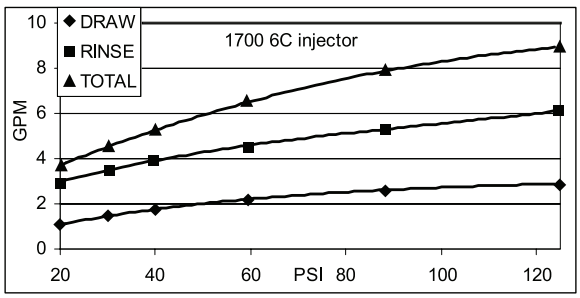



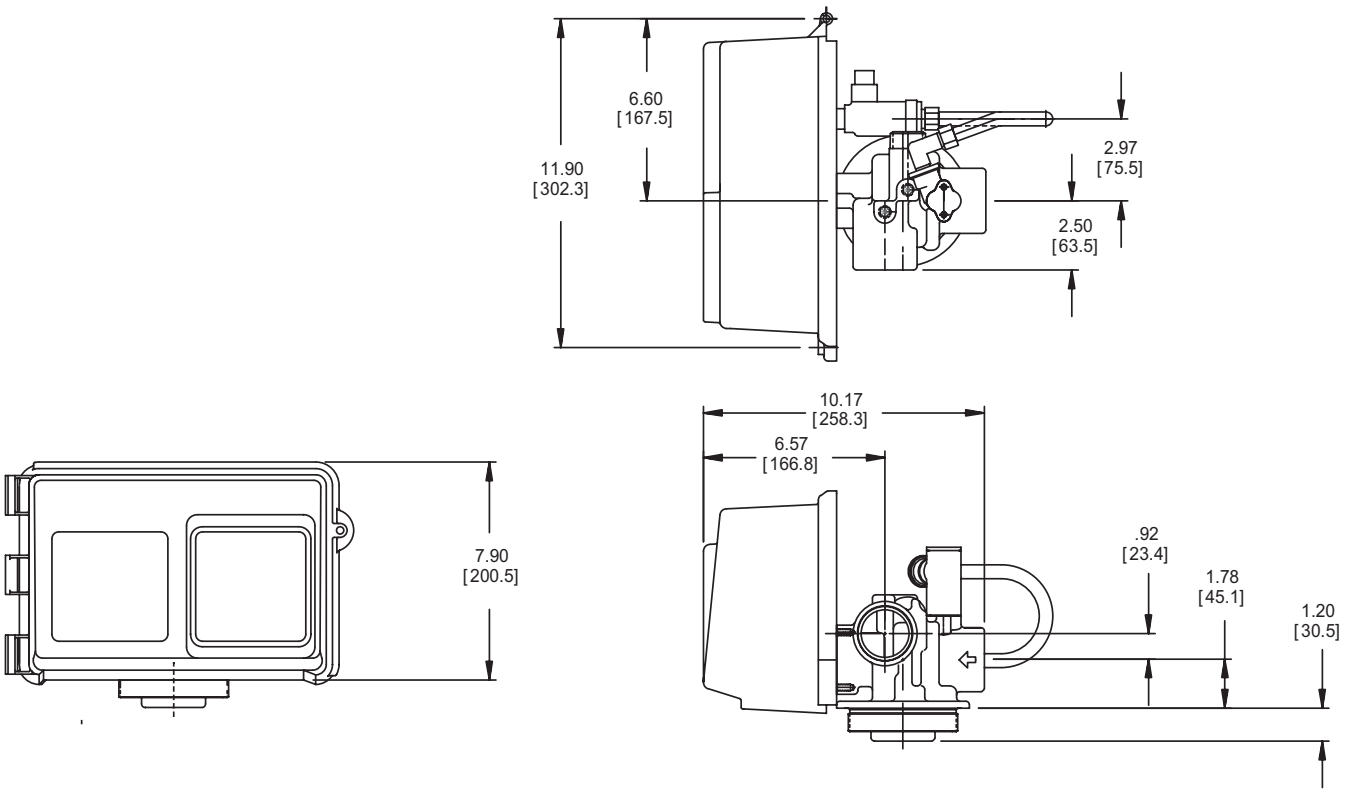



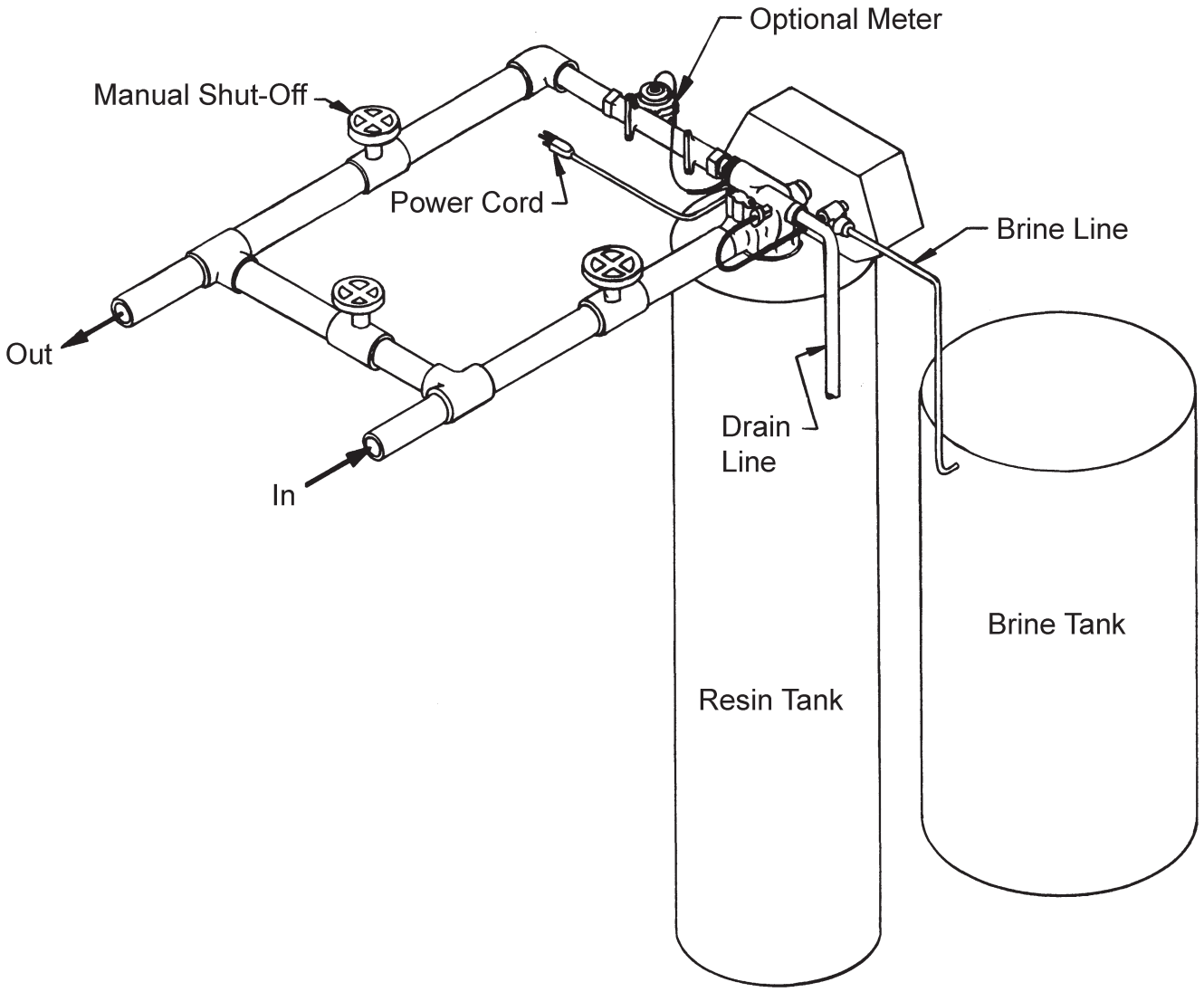

TR20391_REVA

# Dimensions

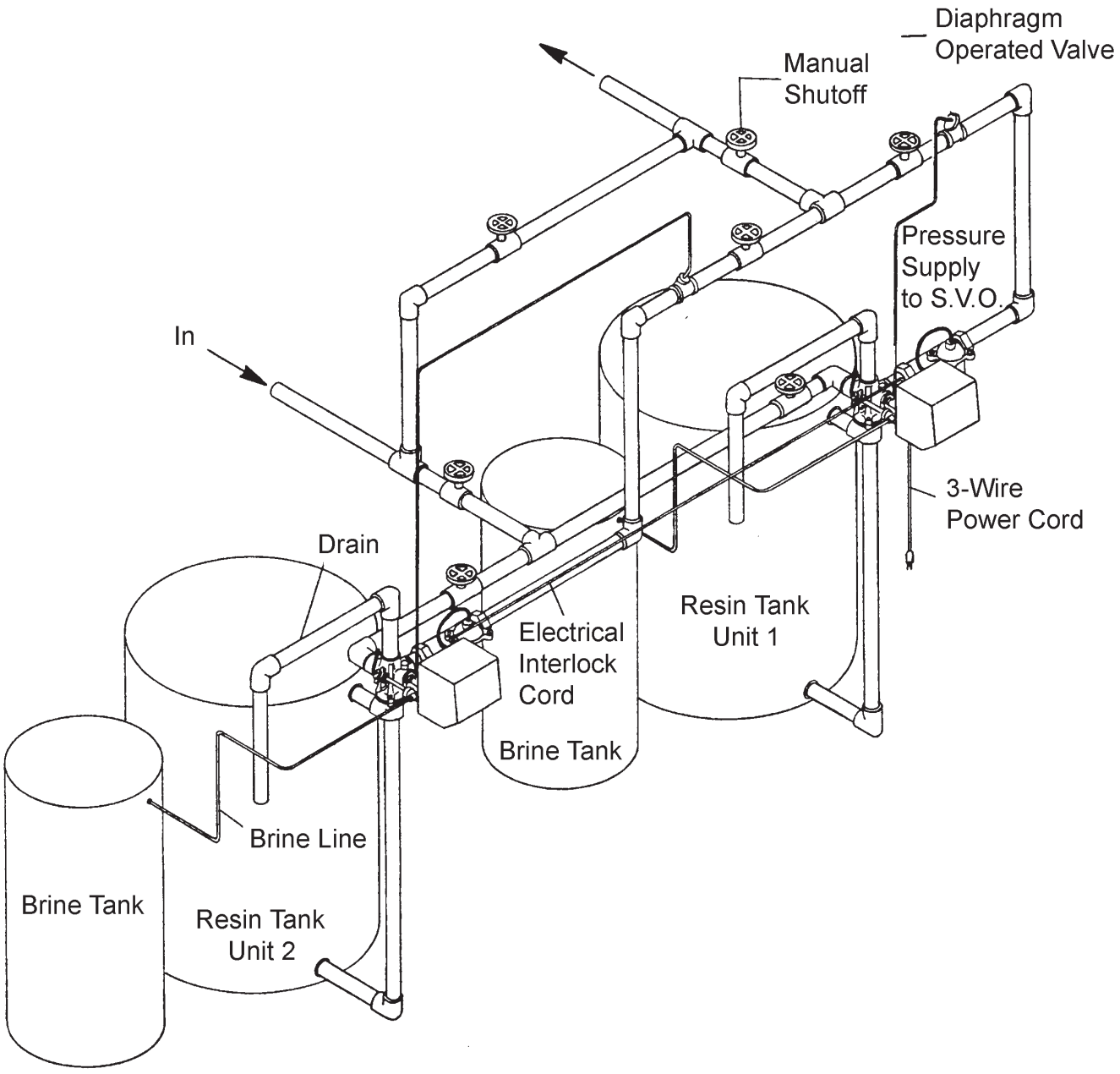



61500-2850 LNE REV A

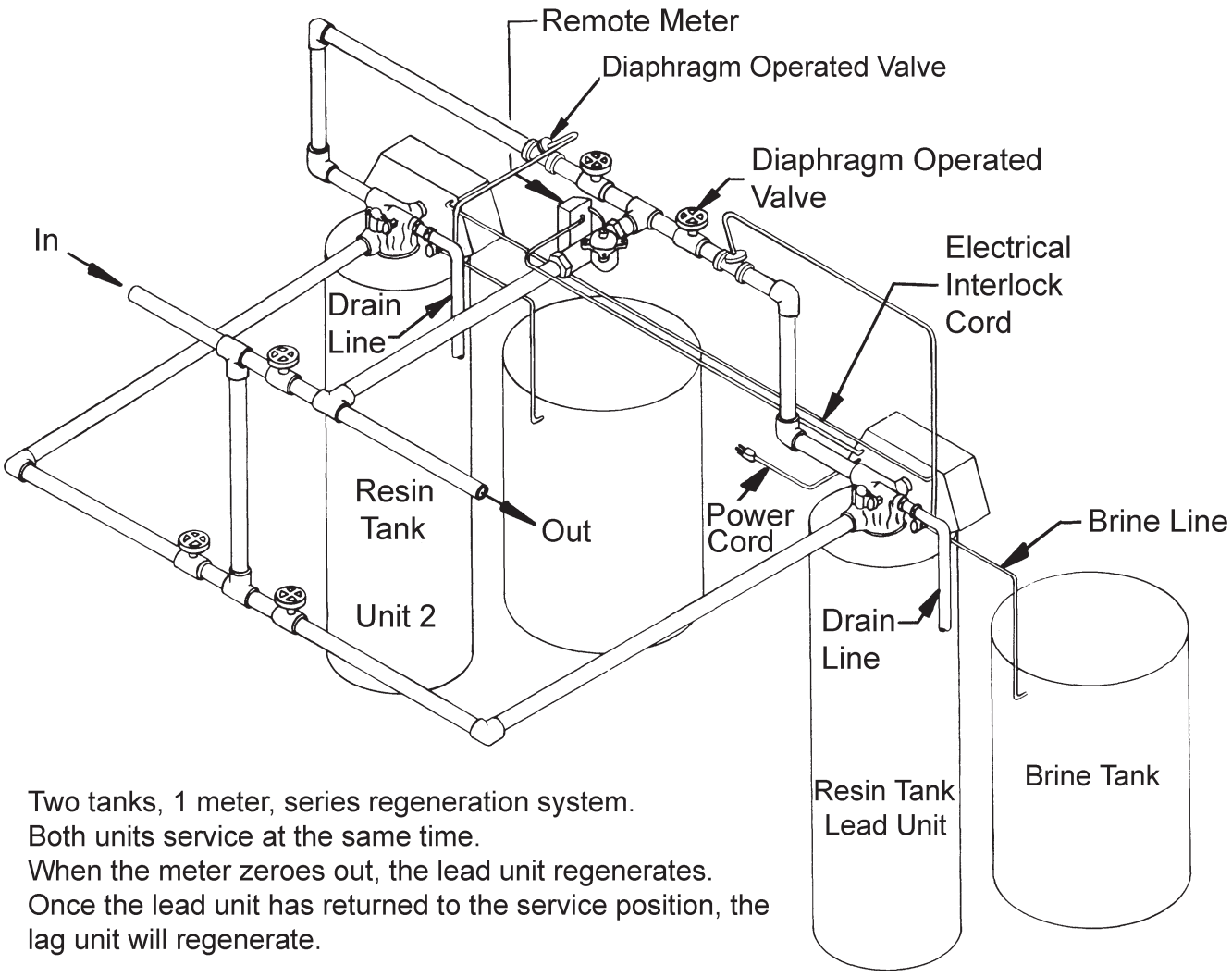
# *System #4 - Typical Single Tank Installation with Optional Meter*



# *System #5 Interlock - Typical Twin Tank Installation with Optional Meter Interlock and No Hard Water Bypass*

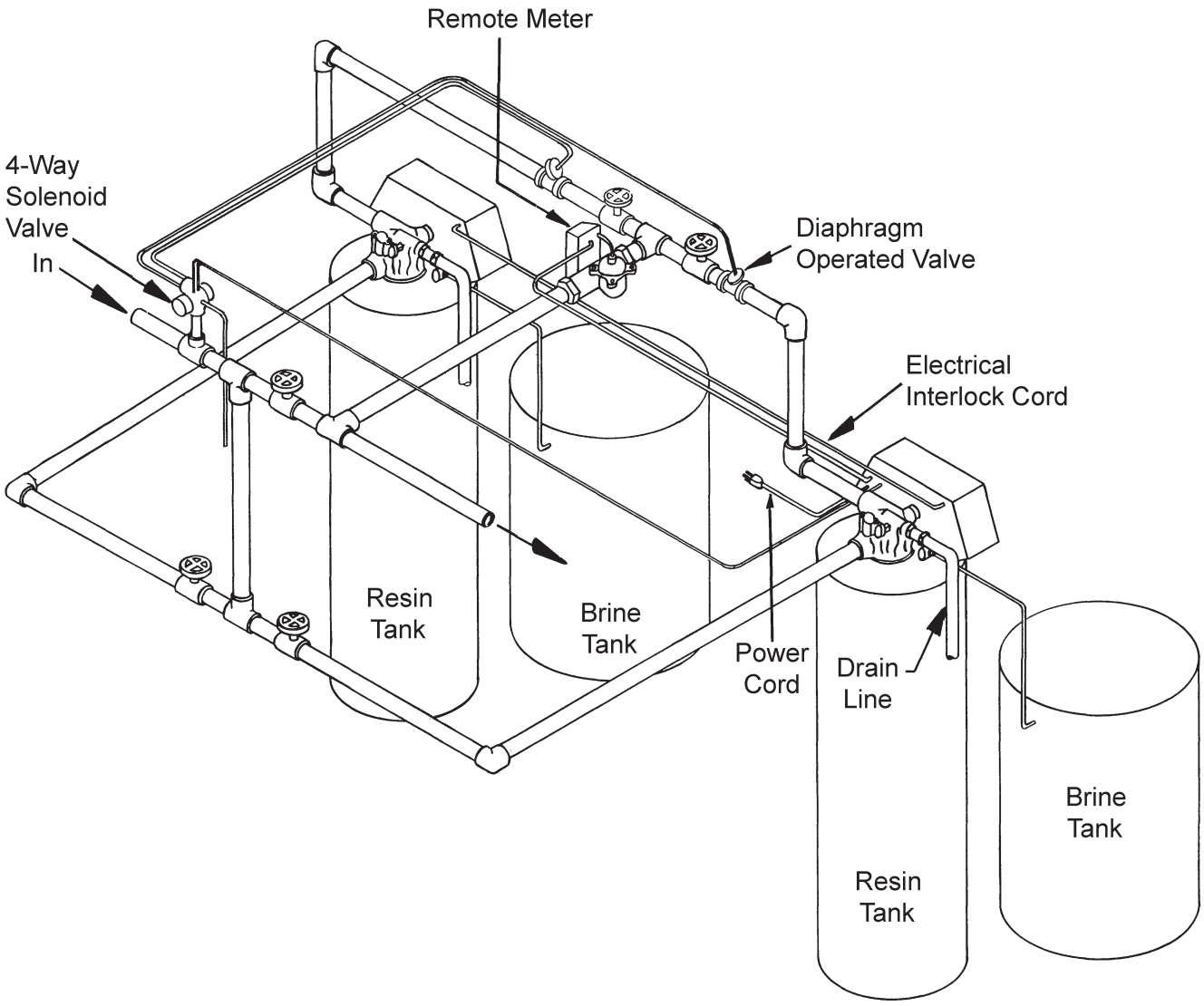


# *System #6 - Twin Series Regeneration Installation with a Remote Meter*

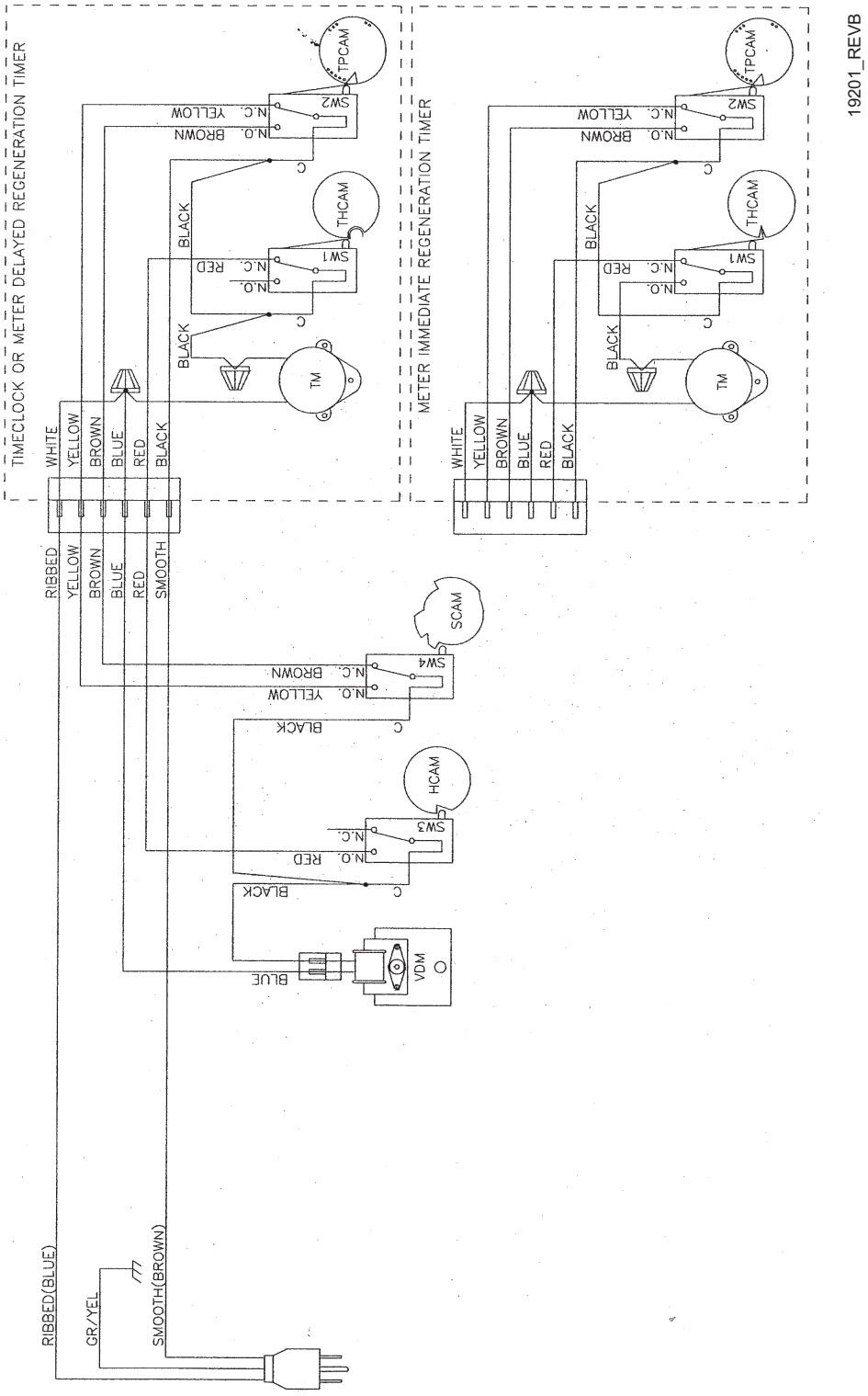


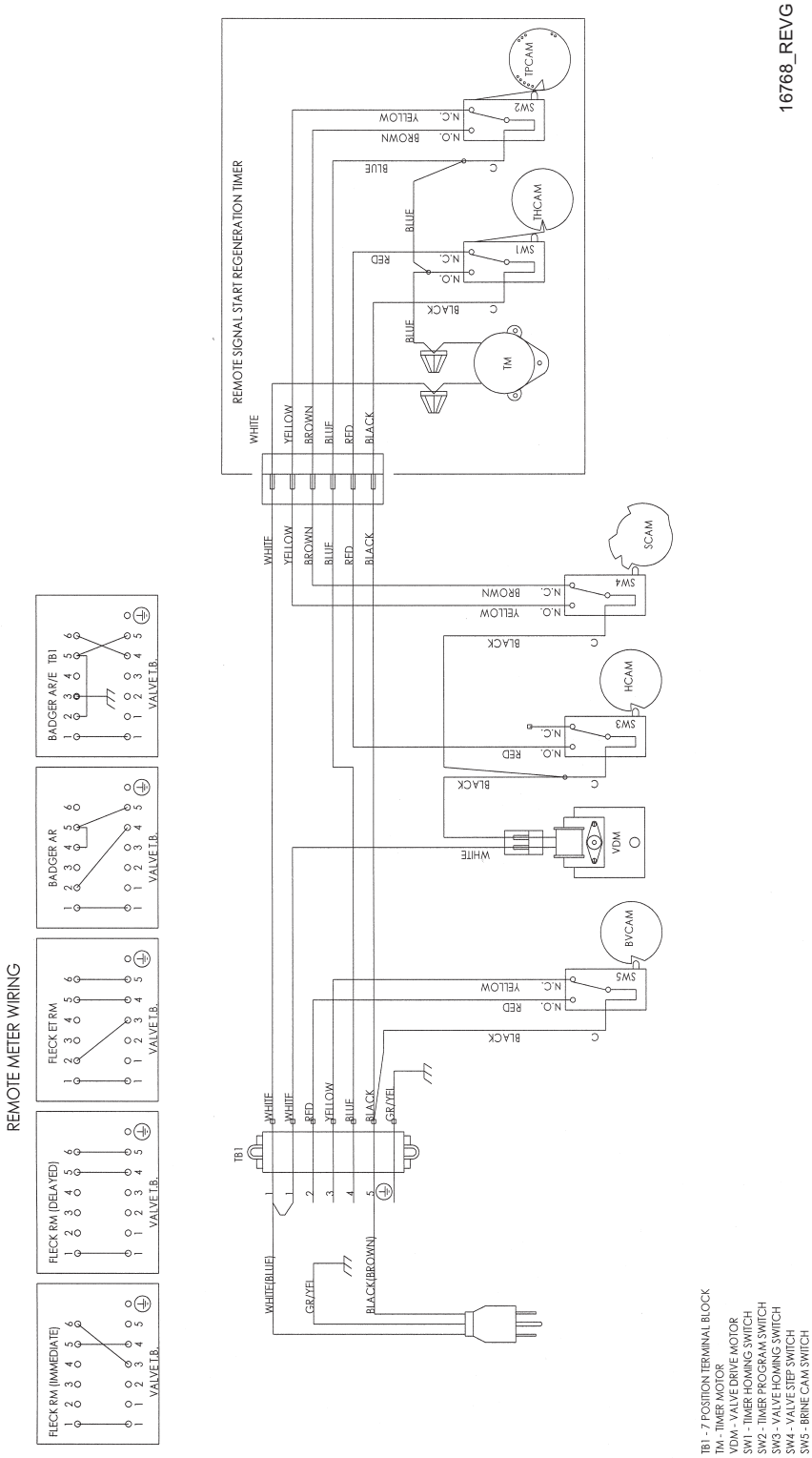

Two tanks, 1 meter, series regeneration system.
Both units service at the same time.
When the meter zeroes out, the lead unit regenerates.
Once the lead unit has returned to the service position, the lag unit will regenerate.

# System #7 - Twin Alternator Installation with a Remote Meter

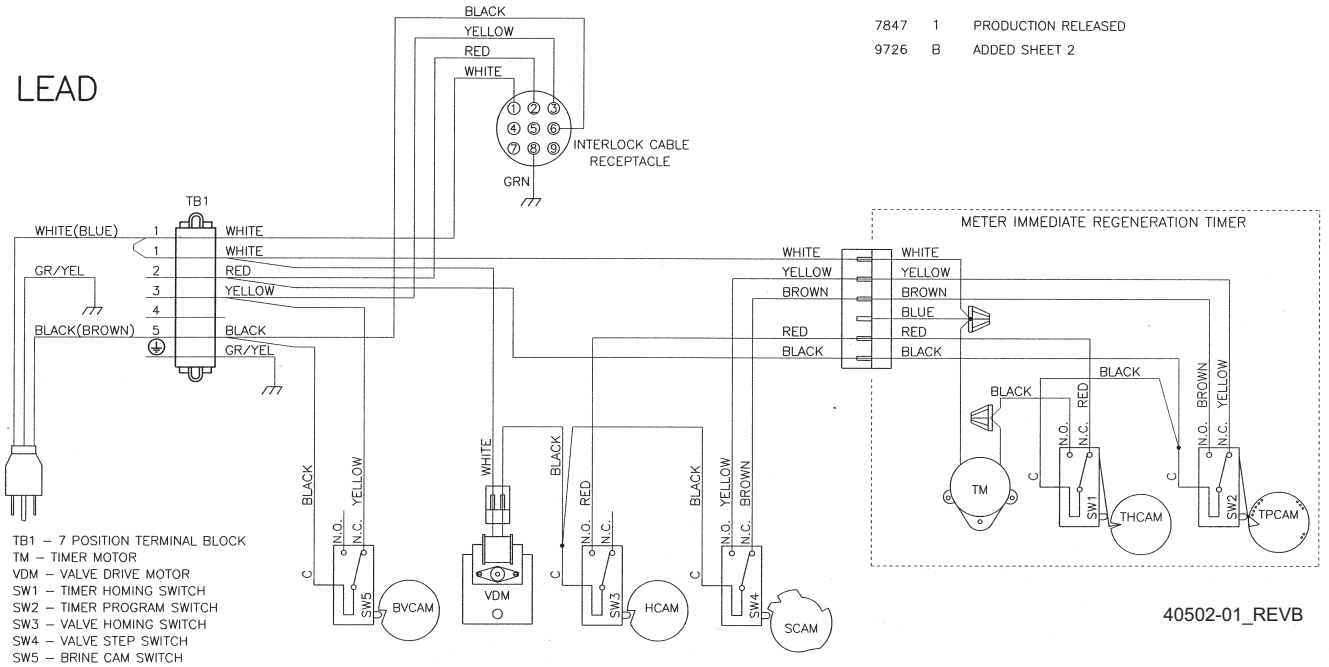


# System #4 - Single Valve Regeneration
# Immediate and Delayed Valve Wiring



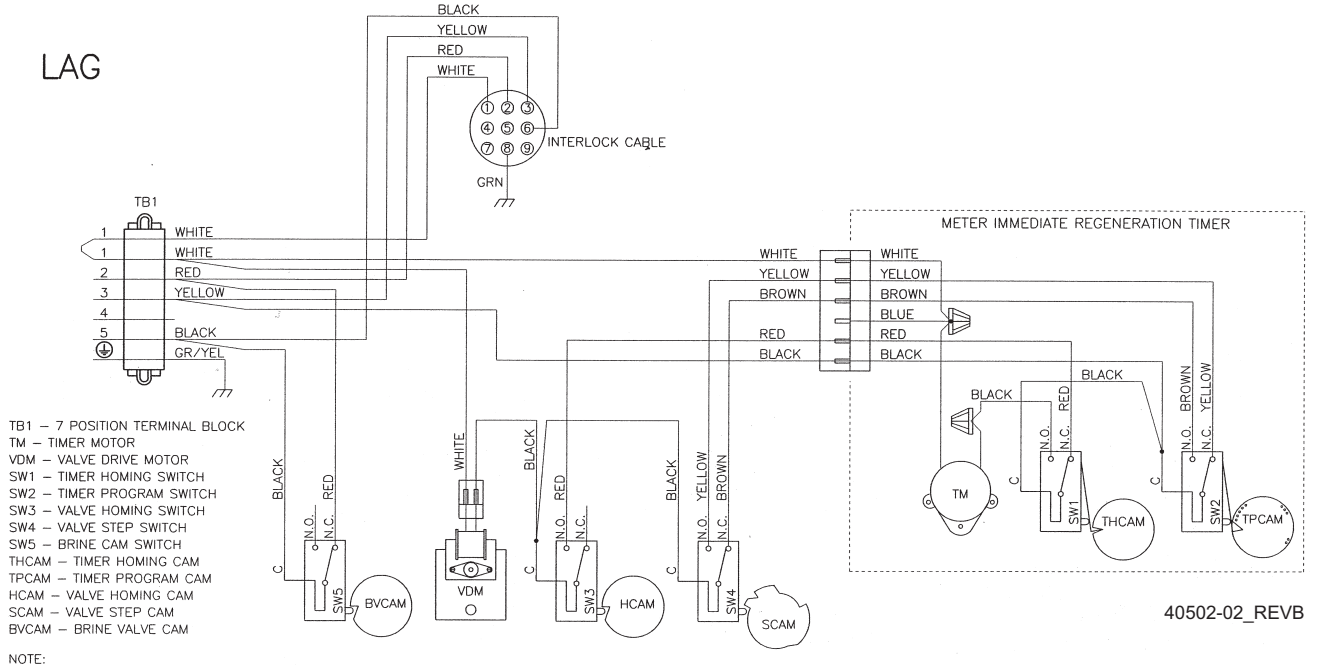

REMOTE METER WIRING
FLECK RM (IMMEDIATE)
FLECK RM (DELAYED)
FLECK ET RM
BADGER AR
BADGER AR/E TB1
VALVE I.B.
REMOTE SIGNAL START REGENERATION TIMER
WHITE
YELLOW
BROWN
BLUE
RED
BLACK
TPCAM
SW2
N.C.
N.O.
C
THCAM
SW1
TM
SCAM
SW4
HCAM
SW3
VDM
BVCAM
SW5
TB1
WHITE(BLUE)
GR/YEL
BLACK(BROWN)
16768_REVG
TB1 - 7 POSITION TERMINAL BLOCK
TM - TIMER MOTOR
VDM - VALVE DRIVE MOTOR
SW1 - TIMER HOMING SWITCH
SW2 - TIMER PROGRAM SWITCH
SW3 - VALVE HOMING SWITCH
SW4 - VALVE STEP SWITCH
SW5 - BRINE CAM SWITCH
THCAM - TIMER HOMING CAM
TPCAM - TIMER PROGRAM CAM
HCAM - VALVE HOMING CAM
SCAM - VALVE STEP CAM
BVCAM - BRINE VALVE CAM
NOTE:
1. SINGLE TANK REMOTE METER INITIATED DELAYED, OR IMMEDIATE REGENERATION.
2. WITH 24V VALVES THE POWER CORD IS REPLACED WITH BLUE AND WHITE WIRES (WIRE BLUE TO TB1 #5, WHITE TO TB1 #1).
3. VALVE SHOWN IN SERVICE POSITION.

# System #5 - Interlocked Regeneration Valve Wiring



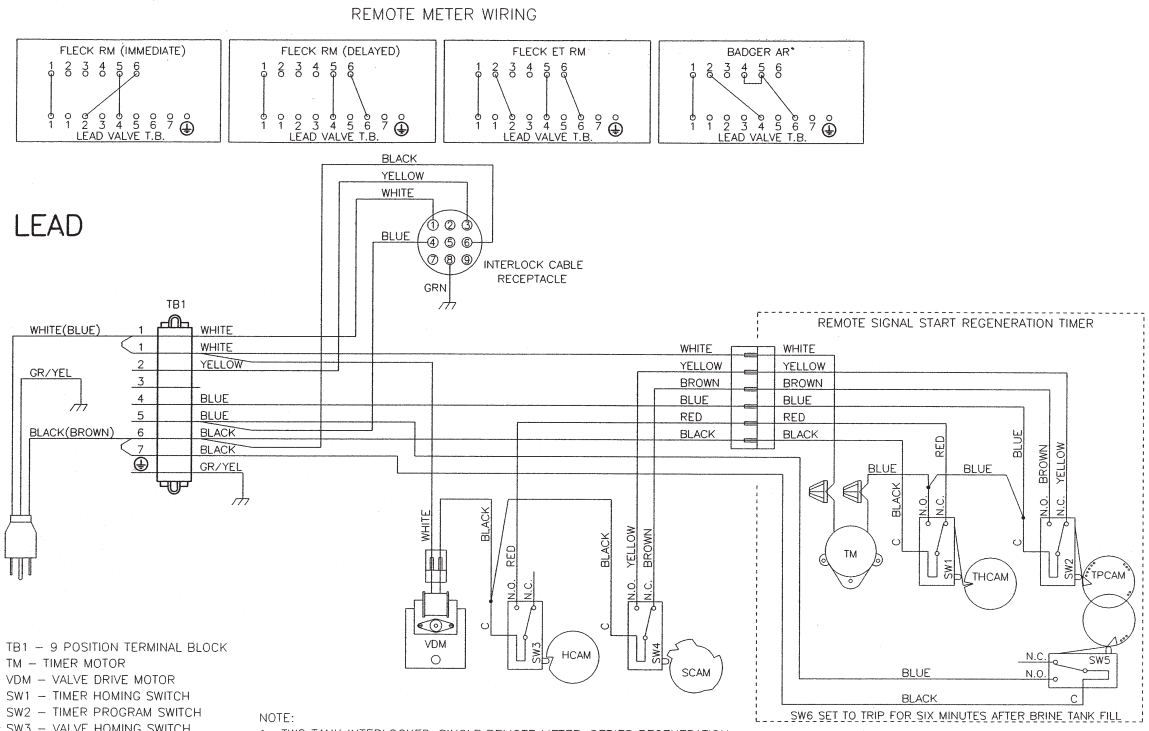

TB1 – 7 POSITION TERMINAL BLOCK
TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM

NOTE:
1. BOTH VALVES IN SERVICE, ONLY ONE VALVE IN REGENERATION AT A TIME.
2. INDIVIDUAL LOCAL METER REGENERATION.
3. VALVE SHOWN IN SERVICE.




TB1 – 7 POSITION TERMINAL BLOCK
TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM

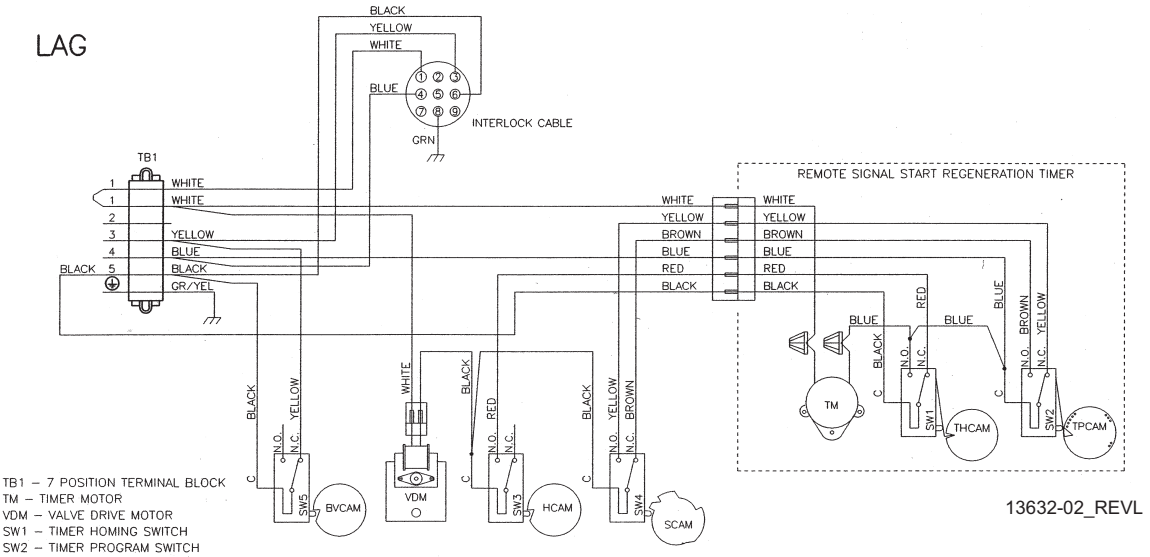
NOTE:
1. BOTH VALVES IN SERVICE, ONLY ONE VALVE IN REGENERATION AT A TIME.
2. INDIVIDUAL LOCAL METER REGENERATION.
3. VALVE SHOWN IN SERVICE.




TB1 – 9 POSITION TERMINAL BLOCK
TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – AUXILIARY TIMER SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM

NOTE:
1. TWO TANK INTERLOCKED, SINGLE REMOTE METER, SERIES REGENERATION.
2. BOTH TANKS NORMALLY IN SERVICE.
3. ONLY ONE TANK IN REGENERATION, THE OTHER REMAINS IN SERVICE.
4. LEAD VALVE REGENERATES FIRST, FOLLOWED IMMEDIATELY BY LAG VALVE.
5. WITH 24V VALVES THE POWER CORD IS REPLACED WITH BLUE AND WHITE WIRES (WIRE BLUE TO TB1 #6, WHITE TO TB1 #1).
6. VALVE SHOWN IN SERVICE POSITION.

13632-01_REVK

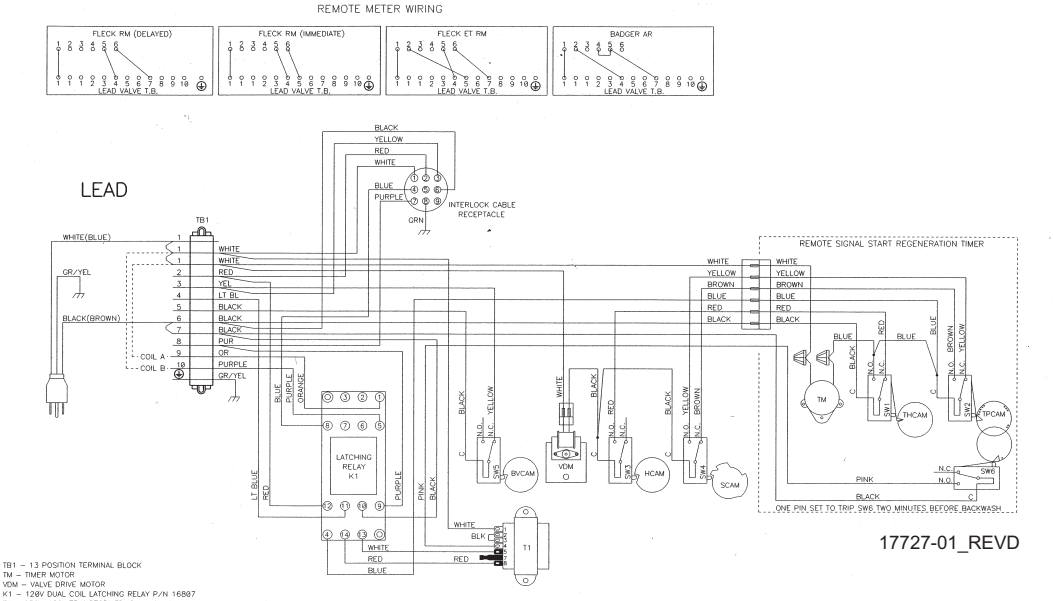



TB1 – 7 POSITION TERMINAL BLOCK
TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM

NOTE:
1. TWO TANK INTERLOCKED, SINGLE REMOTE METER, SERIES REGENERATION.
2. BOTH TANKS NORMALLY IN SERVICE.
3. ONLY ONE TANK IN REGENERATION, THE OTHER REMAINS IN SERVICE.
4. LEAD VALVE REGENERATES FIRST, FOLLOWED IMMEDIATELY BY LAG VALVE.
5. WITH 24V VALVES, THE POWER CORD IS REPLACED WITH BLUE AND WHITE WIRES (WIRE BLUE TO TB1 #6, WHITE TO TB1 #1).
6. VALVE SHOWN IN SERVICE POSITION.

13632-02_REVL

# System #7 - Alternating Regeneration
# 24V / 120V / 3-Way Solenoid Output Valve Wiring

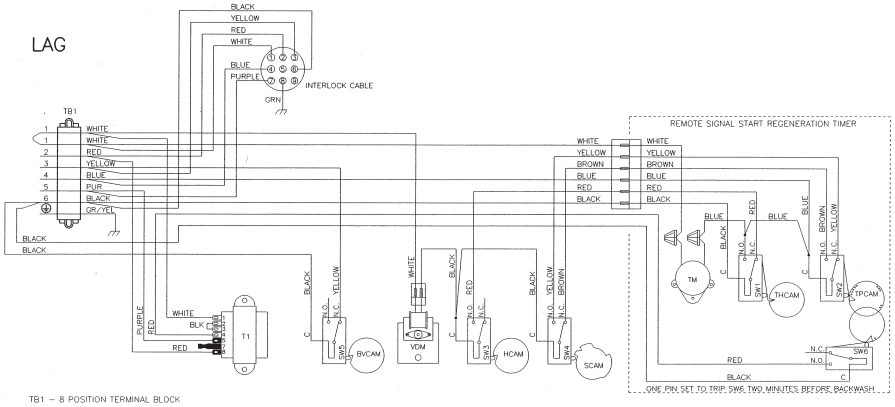



17727-01_REVD

TB1 – 13 POSITION TERMINAL BLOCK
TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
K1 – 120V DUAL COIL LATCHING RELAY P/N 16807
T1 – 230V/120V TRANSFORMER P/N 40112
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
SW6 – TIMER AUXILIARY SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM

RELAY TERMINAL BLOCK PINOUT (SHOWN IN RESET POSITION)

NOTE:
1. TWO TANK SINGLE REMOTE METER ALTERNATING REGENERATION. ONLY ONE TANK IN SERVICE THE OTHER IN REGENERATION OR STANDBY.
2. SYSTEM WIRED FOR 3-WAY SOLENOID OUTPUT. COIL A CLOSES THE DIAPHRAGM VALVES OF LAG UNIT. COIL B CLOSES THE DIAPHRAGM VALVES OF LEAD UNIT.
3. VALVE SHOWN IN SERVICE POSITION.




17727-02_REVD

TB1 – 8 POSITION TERMINAL BLOCK
TM – TIMER MOTOR
T1 – 230V TO 120V TRANSFORMER P/N 40112
VDM – VALVE DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
SW6 – TIMER AUXILIARY SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM

NOTE:
1. TWO TANK SINGLE REMOTE METER ALTERNATING REGENERATION. ONLY ONE TANK IN SERVICE THE OTHER IN REGENERATION OR STANDBY.
2. SYSTEM WIRED FOR 3-WAY SOLENOID OUTPUT. COIL A CLOSES THE DIAPHRAGM VALVES OF LAG UNIT. COIL B CLOSES THE DIAPHRAGM VALVES OF LEAD UNIT.
3. VALVE SHOWN IN SERVICE POSITION.

**24 Hour Gear Assemblies**

19205 ..... Gear Assy, 24 Hour, Silver, 5600, 12 A.M.
60519-02 Gear Assy, 3200 24 Hour 2 Times/ Day, w/Silver Label
60519-03 ..... Gear Assy, 3200, 24 Hour 3 Times/Day, w/Silver Label
60519-04 ..... Gear Assy, 3200, 24 Hour 4 Times/Day, w/Silver Label
60519-06 ..... Gear Assy, 3200, 24 Hour (12:00) 6 Times/Day, w/Silver Label

**Adapters**

61415 ..... Adapter Assy, Sidemount 2850/2900/2930
61415NP ..... Adapter Assy, Sidemount, NP 2850/2900/2930
61415-20 ..... Adapter Assy, Sidemount, BSP/MTC 2850/2900/2930
61415-20NP ..... Adapter Assy, Sidemount, BSP/NP 2850/2900/2930

**Air Checks**

60002-34 ..... Air Check, #500, 34” Long
60003-34 ..... Air Check, #500, HW, 34” Tube
60009-01 ..... Air Check, #900, Commercial, HW Less Fittings

**Auxiliary Micro Switch**

60320-02 ..... Switch Kit, 3200/9000 Timer Auxiliary
60320-07 ..... Switch Assy, 2850, Aux w/Self Tapping Screws
60320-12 ..... Switch Assy, 1500 through 2850

**Brine Line Flow Control (BLFC)**

60020-25 ..... BLFC, .25 GPM, 1600
60020-50 ..... BLFC, .50 GPM, 1600
60020-100 ..... BLFC, 1.0 GPM, 1600
60011-090 ..... Brine Valve, 1650, Short Stem
60010-25 ..... BLFC, 1650, .25 GPM, Plastic
60010-50 ..... BLFC, 1650, .50 GPM, Plastic
60010-100 ..... BLFC, 1650, 1.0 GPM, Plastic

**Brine Valves**

60011 ..... Brine Valve, 1650, Less BLFC
60029 ..... Brine Valve, 1600, Short Stem Brass, Std O-rings
60029HW ..... Brine Valve, 1600, Short Stem Hot Water
60034-xx ..... 1700 Brine Valve Assy (Specify flow control 1.0 - 5.0)
60604-xx ..... Model 1710 Brine Valve Assy (Specify flow control 1.0 - 5.0)

**Cam Assemblies**

60160-15 ..... Drive Cam Assy, STF, Blue

**Covers**

60219-xx ..... Environmental
60232-xx ..... Designer 2 Piece
60232-110 ..... Cover, Designer, 1 Pc Black

**Drain Line Flow Controls**

60366-xx ..... 1” FNPT x 3/4” FNPT (Specify flow control .6 - 7.0)
60701-xx ..... 1” FNPT x 1” FNPT (Specify flow control 8.0 - 25.0)
60702-xx ..... 1” FNPT x 1” MNPT (Specify flow control 8.0 - 25.0)
60708-xx ..... 1” FNPT x 3/4” FNPT (Specify flow control 8.0 - 25.0)
60721-xx ..... 1” FNPT x 1” FNPT (Specify flow control .6 - 7.0)

**Drive Assemblies**

60050-21 ..... Drive Assy, 2750, STF, 120V Softener

**Injector Assemblies (Complete)**

60381-xx ..... 1700 Injector Assy (Specify size of Injector)
60480-xx ..... 1600 - 3/8” Brine (Specify size of injector)
60481-xx ..... 1600 Brass - 3/8” Brine (Specify size of injector)
60483-xx ..... 1700 - 1/2” Brine (Specify size of Injector)

**Meters**

60613 ..... Meter Assy, 2750, Electronic 1”
60610-01 ..... Meter, 2850/9500, 1 1/2” Std
60610-02 ..... Meter, 2850/9500, 1 1/2” Ext
60391 ..... Meter Assy, 2750
60392 ..... Meter Assy, 2750, 1” Ext
60614 ..... Meter Assy, 2850/9500, Electronic 1 1/2” Meter, Brass

61560-01 ..... Meter Assy, In-Line, w/1” NPT Plstc Connector
61560-07 ..... Meter Assy, In-Line, w/1” NPT Brass Connector
61560-09 ..... Meter Assy, In-Line, w/ 1 1/2” NPT Brass Connector

**Piston Assemblies**

60105 ..... Piston Assy, 2850
60105-001 ..... Piston Assy., 2850, 560CD
60105-01 ..... Piston Assy., 2850, Hot Water
60114-00 ..... Piston Assy, Filter, 2850 Conversion, NHWBP
60114-01 ..... Piston Assy, 2850, NHWBP
60114-02 ..... Piston Assy, 2850, 1600 Conversion, NHWBP
60114-03 ..... Piston Assy, 2850, 1700 Conversion, NHWBP

**Program Wheel Assemblies**

60405-20 ..... Program Wheel, w/3/4” Ext Label
..... 1 1/2” Std Set @ 100
60405-30 ..... Program Wheel, w/1” Std Label
..... Set @ 50
60405-40 ..... Program Wheel, w/1” Ext Label
60405-70 ..... Program Wheel, w/1” Ext Label

**Safety Brine Valves**

60014 ..... Safety Brine Valve Assy, 2310
60038 ..... Safety Brine Valve, 2350
60028-30 ..... Float Assy, 2350, 30”, White
60026-30SAN Float Assy, 2350, 30” HW
60027-FFA ..... Safety Brine Valve Body, 2300 Fitting Facing Arm
60027-FFS ..... Safety Brine Valve Body Fitting Facing Stud
60028-30 ..... Float Assy, 2300, 30”, Blue/White
60068-30 ..... Float Assy, 2310, w/30” Rod

**Sales and Service Aids**

40726 ..... Literature, 2850 Spec Sheet
16510 ..... Literature, 2850 S/Manual
40717 ..... Literature, Catalog Assy, PWT Residential/Commercial

**Seal & Spacer Kits**

60129 ..... Seal & Spacer Kit, 2850
60129-20 ..... Seal & Spacer Kit, 2850, Natural
60129-30 ..... Seal & Spacer Kit, 2850

**Service Equipment**

16174 ..... Silicone, 2 oz. Tube
16586-8 ..... Silicone, Dow #7 8 Lb
16516 ..... Stuffer Assy, 2850/9500
17623 ..... Puller Tool Assy, 2850/9500
60460 ..... Meter Checker Kit, Std
60461 ..... Meter Checker Kit, Ext

**Service Valve Operator Assemblies (SVO)**

60150 ..... SVO Assy, 1600 O/S
60150-01 ..... SVO Assy, 1600 N/S

**Skipper Wheel Assemblies**

14860 ..... Skipper Wheel Assy, 7 Day
14381 ..... Skipper Wheel Assy, 12 Day